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The Mineral Industry of Pennsylvania in 1964

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The Mineral Industry of Pennsylvania

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By James R. Kerr [1]

THE VALUE of the mineral industry of Pennsylvania increased to $902 million, the highest level since 1957, and 5 percent greater than that of 1963. The bituminous coal industry, responding to greater demand by the metallurgical and electric utility markets, increased production by 5 million tons. Value of bituminous coal production was 11 percent ($38.1 million) more than that of 1963. This was attributed to increases in both tonnage and prices. The average price f.o.b. mine rose $0.17 to $5.07 per ton.

The healthy National economy, which spurred the iron and steel industry also stimulated those mineral industries providing raw material for iron and steel manufacture. For example, limestone for blast-furnace flux; lime for open-hearth and oxygen furnace flux; clay for refractory products; and iron ore, the major ingredient, were produced in greater quantities than in 1963. In addition, the iron ore-associated byproducts, such as cobalt, pyrite, and gold and silver were produced in greater quantities because of processing of larger tonnages of crude iron ore.

Output of zinc ore increased in response to higher prices and a firm market for zinc metal. Increased roadbuilding programs and increased construction of private and public buildings required larger quantities of sand and gravel and crushed stone for aggregate uses.

The greatest declines in value among the State mineral industries were $4.9 million in anthracite production and $3.8 million in cement production. The drop in anthracite output was due to significant decreases in exports, principally to Western Europe. The cement industry in the eastern half of the State continued to operate with capacities in excess of available East Coast markets. These cement companies were fighting to retain the old markets and to share in the new in a highly competitive, price-conscious area.

Petroleum and natural gas industries shared a loss in value of $2.8 million. Petroleum average prices decreased $0.24 per barrel, and natural gas output was 11 percent (10.5 billion cubic feet) less than that of 1963 because of reduced pressure and flow at many of the old wells.

Leading producing counties, with primary commodities in parentheses, were Washington and Greene (bituminous coal), Northampton

[1] Mining engineer, Bureau of Mines, Pittsburgh, Pa.

TABLE 1.—Mineral production in Pennsylvania [1]

Mineral	1963		1964	
	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:				
Portland—376-pound barrels	38,316,209	$118,203	37,662,763	$113,409
Masonry—280-pound barrels	2,509,948	6,611	2,817,796	7,594
Clays [2]—short tons	3,190,605	14,717	3,187,100	15,814
Coal:				
Anthracite—do	18,267,384	153,503	17,184,251	148,648
Bituminous—do	71,500,953	350,085	76,530,758	388,218
Copper—do	4,434	2,731	3,614	2,356
Gem stones	[3]	4	[3]	4
Lime—short tons	1,188,217	17,548	1,440,285	20,656
Natural gas—million cubic feet	92,657	24,091	82,166	22,349
Natural gas liquids:				
Natural gasoline—thousand gallons	1,311	78	1,138	64
LP gases—do	1,721	118	1,481	100
Peat—short tons	33,952	339	29,500	397
Petroleum (crude)—thousand 42-gallon barrels	5,083	23,178	5,113	22,088
Sand and gravel—short tons	14,965,816	23,539	16,199,000	26,414
Stone—do	49,535,776	83,450	52,829,268	91,075
Zinc [4] (recoverable content of ores, etc.)—short tons	27,389	6,572	30,754	8,345
Value of items that cannot be disclosed:				
Clays (kaolin), cobalt, gold, iron ore, mica, pyrites, sericite schist, silver, and tripoli	XX	32,644	XX	34,519
Total	XX	r 857,411	XX	902,050

r Revised. XX Not applicable.

[1] Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2] Excludes kaolin; included with "Value of items that cannot be disclosed."

[3] Weight not recorded.

[4] Recoverable zinc valued at the yearly average price of Prime Western slab zinc, East St. Louis market. Represents value established after transportation, smelting, and manufacturing charges have been added to the value of ore at the mine.

(cement), Luzerne (anthracite), Schuylkill (anthracite), and Cambria (bituminous coal).

Legislation and Government Programs.—Most governmental activity was with the bituminous and anthracite coal industries; the following items were mostly taken from local press sources.

Satisfactory compliance with its new strip mining law was reported by State officials. The greatest area of violation was in not taking proper measures to handle the difficult drainage problem. State officials reported that costs of soil restoration under the new law were averaging $250 to $350 per acre or 9 cents to 17 cents per ton of coal.

A four-man task force was designated by the Governor to unify State programs aimed at combating and relieving problems created by coal mining. Such problems included surface subsidence from underground mines, stream pollution, strip mine reclamation, elimination of culm piles, and control of underground fires.

The State Land Reclamation Board has approved plans to convert two Mercer County strip pits into lakes. The regulation about converting old strip mines to lakes stipulated that the water impounded be pure. If the impounded water was acid, a sudden outwash could result in a serious pollution problem.

The State Department of Mines was reportedly taking steps to reseal several abandoned underground mines where floods had broken the old seals early in 1964.

Steel companies with captive coal mining operations in southwestern Pennsylvania have contributed to State sponsored research programs

designed to combat the problem of stream pollution from acid mine water. Representatives of the Western Pennsylvania Coal Operators Association also contributed to the State program to control stream pollution. The State awarded a contract for construction of a portable pilot plant for mine drainage be put into operation in an effort to provide technical and economic data on processing mine drainage to abate pollution.

The State Secretary of Health announced plans for a thorough study of the disease anthracosilicosis, a progressive lung disease affecting both bituminous and anthracite miners.

The State Air Pollution Commission refused a request for permission to operate a coal refuse pile in Western Pennsylvania because applicant refused to meet certain requirements stipulated by the Commission.

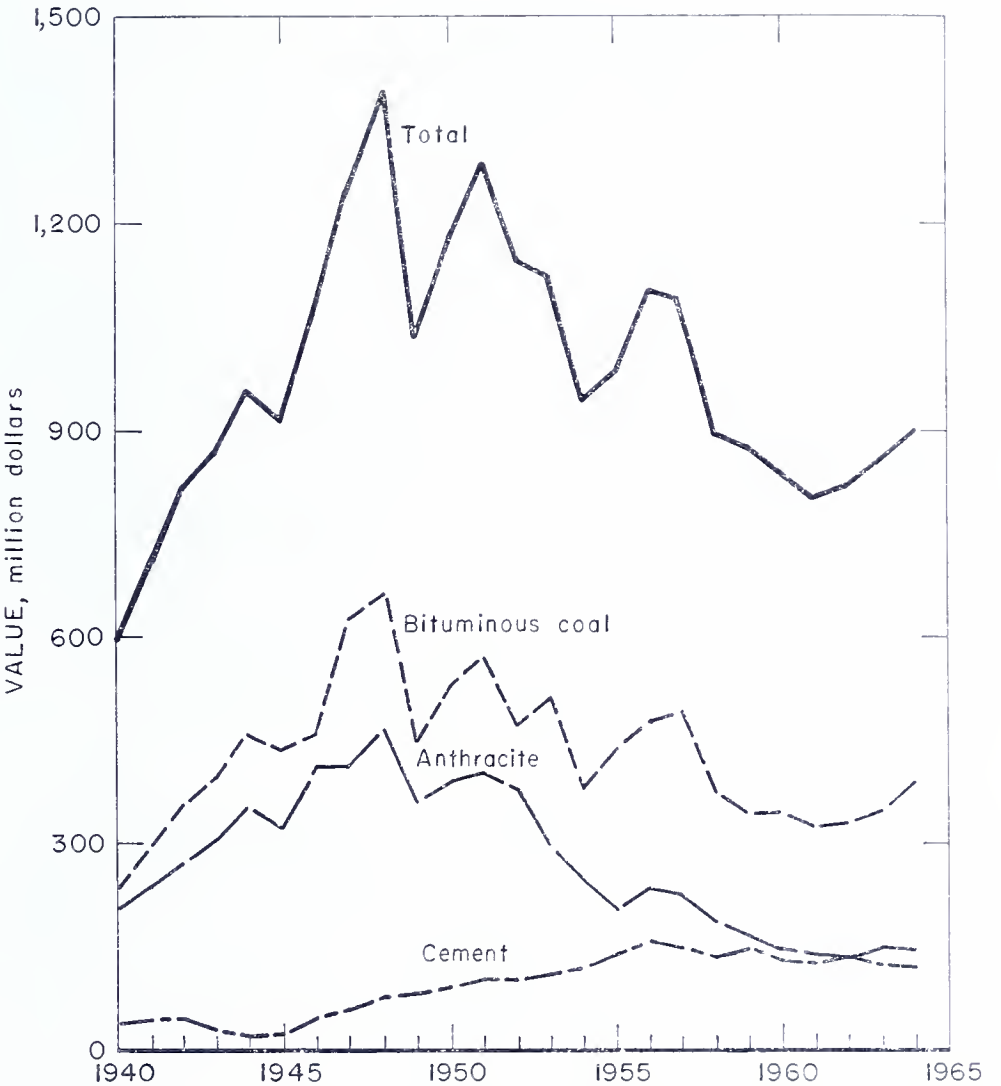

FIGURE 1.—Value of bituminous coal, anthracite, cement, and total value of mineral production in Pennsylvania.

TABLE 2.—Value of mineral production in constant 1957–59 dollars

(Millions)

Year	Value	Year	Value
1940	$1,523	1953	$1,135
1941	1,619	1954	991
1942	1,735	1955	982
1943	1,662	1956	1,105
1944	1,719	1957	1,058
1945	1,512	1958	889
1946	1,576	1959	891
1947	1,532	1960	862
1948	1,438	1961	839
1949	1,092	1962	r 869
1950	1,249	1963	r 917
1951	1,319	1964	965
1952	1,179		

r Revised.

TABLE 3.—Employment and injury experience in the mineral industries

Year and industry	Men working daily	Man-days worked (thousands)	Man-hours worked (thousands)	Injuries		Injuries per million man-hours
				Fatal	Nonfatal	
1963:						
Bituminous coal	25,414	5,334	42,761	22	959	23
Anthracite	13,498	2,912	21,048	32	1,295	63
Metal and nonmetal	3,016	737	6,200	1	132	21
Sand and gravel	1,162	245	2,068	1	43	21
Stone	8,957	2,340	19,154	4	249	13
Peat	49	10	81		2	25
Total	52,096	11,578	91,312	60	2,680	30
1964 p:						
Bituminous coal	27,000	5,939	48,070	18	1,035	22
Anthracite	13,144	2,812	20,368	24	1,342	67
Metal and nonmetal	3,000	778	6,415	2	156	25
Sand and gravel	1,185	272	2,290		45	20
Stone	8,920	2,391	19,946	3	321	16
Peat	52	12	95		2	21
Total	53,301	12,204	97,184	47	2,901	30

p Preliminary.

REVIEW BY MINERAL COMMODITIES

MINERAL FUELS

Coal (Anthracite).—The quantity of anthracite coal exported was less than half that in 1963, dropping from 3.4 to 1.6 million tons. This was the principal factor in the 6-percent decrease in anthracite production in 1964. Retail deliveries were 18 percent less than in 1963, and stocks in retail dealers yards increased by 9 percent. Increased consumption of anthracite by electric utilities and by coke plants, 5 percent and 9 percent, respectively, did not overcome the loss in exports. The more significant reductions in anthracite exports were those to the Netherlands, France, and Belgium.

Of total anthracite production, 7.2 million tons was recovered from strip mines; 5.9 million tons from underground mines; 3.4 million tons from culm banks, and 705,000 tons from dredges. Of underground

production, 3.5 million tons was loaded mechanically; 64 percent was loaded by 495 conveyors (including duckbills) and pit-car loaders, 22 percent by 139 scraper loaders, and 14 percent by 31 mobile loaders. Dredges on the Susquehanna River accounted for 86 percent of output by dredging; the balance was dredged from the Schuylkill River. Culm bank production was reported in three regions, 46 percent in Schuylkill, and 27 percent each in the Lehigh and Wyoming regions.

The leading counties in anthracite production were Luzerne, Schuylkill, Northumberland, Lackawanna, and Columbia. Men employed in these counties totaled 12,586, about three-fourths were in Luzerne and Schuylkill. All told, 13,144 men were employed by the anthracite industry, a decrease of 354 men from 1963. Most of the lost employment was due to reduced employment at underground mines. The men employed worked an average of 214 days, totaling 2.8 million man-days. This included employment at all fresh mining operations, (underground and strip), dredging operations, and at culm banks. Mining employment was centered in the Schuylkill and Wyoming regions. There were 24 fatal injuries at the anthracite mines, 8 less than in 1963. Although there were 47 more nonfatal injuries, the nonfatal injury rate increased by 4.36 to 65.89 injuries per million man-hours of exposure. The fatal injury rate decreased from 1.52 to 1.18 per million man-hours. Of the fatal injuries, 22 occurred underground and 2 on the surface. Falls of roof, rib, or face killed nine men; haulage accidents, five men; explosives and gas explosions, three each; falls through walkways at breakers two; and inrush of water or of material, one each.

A project was planned to determine whether large-scale culm processing plants could be economically operated by private industry. A coal refuse processing plant built on the Eureka culm pile in the Green Ridge section of Scranton would be designed to process 50 tons of material per hour. Coal recovered at the plant would be sold to a nearby utility company. In addition, a fill material would be recovered as a byproduct for use in mine-flushing programs in the Scranton area. The State project was planned for at least 1 year of operation.

Plans were announced for installation of a new water filtration plant at Erie, where two of four filters of the city were to be rebuilt, utilizing layers of finely ground anthracite coal and sand and gravel as filtration medium. A coagulant aid would be used with the coal and sand.

Coal (Bituminous).—An increase of 6.4 million tons in captive coal production was the major reason for the 7-percent increase in coal production. Both the utility and metallurgical markets were strong. Open-market coal comprised 61 percent of total output; captive coal, 39 percent. Average value of total production was $5.07 per ton, $0.17 per ton more than in 1963. Of total production, 68 percent was mined at 537 underground mines; 31 percent, at 510 strip mines; and 1 percent, at 76 auger mines. There were 59 fewer mines in operation in 1964 (1,123). Of total output, 67 percent was mechanically cleaned, 66 percent of this was by wet washing other than jigs, 19 percent by jigs, and 15 percent by pneumatic methods. Ninety-seven preparation plants were in operation, eight more than in 1963. At 15 of these

plants, 6.9 million tons of coal fines were thermally dried. Of total output, 51 percent was crushed, and 9 percent was treated chiefly with oil, salt, or combinations of the two, for dust allaying or anti-freezing. Shipments were 79 percent by rail or water, 19 percent by truck, and the balance by other means.

Mechanical loading was practiced at 233 of the underground mines, and of underground output 97 percent was loaded by mechanical means. Continuous miners accounted for 75 percent of this total and mobile loading machines accounted for 21 percent. Mechanical loading was accomplished by 270 mobile loaders (7 less than in 1963); 188 loaded cut and blasted coal into shuttle cars, 9 loaded into mine cars, and 8 loaded onto conveyors. Sixty-five mobile loaders operated behind continuous mining machines loading the miner-cut coal. In addition, 12 duckbills (1 less than in 1963) and 168 hand-loaded face conveyors (28 less than in 1963) were in use.

Strip-mining equipment included 839 power shovels (81 less) and 402 draglines (18 less); most were diesel-powered and had less than 3 cubic yards in capacity. However, 13 of these were large plus-12-cubic-yard units. Other equipment included 814 bulldozers, 102 horizontal and 146 vertical overburden drills, 19 carryall scrapers, and 1,654 trucks which averaged 14 tons in capacity. At the 76 auger mines, 79 augers were in use, serviced by 84 trucks that averaged 14 tons in capacity.

Of underground production, 75 percent was mined and loaded by 373 continuous mining machines, 36 machines more than in 1963. In addition, 24 percent of the underground output was cut by 588 cutting machines, 77 less than in 1963. Coal drilling was by 528 hand-held or post-mounted and 54 mobile drills. Roof bolting was accomplished by 296 rotary and 241 percussion drills. Miscellaneous drilling functions were performed with 129 other drills.

Underground haulage was by 1,351 trolley locomotives, 91 battery-powered locomotives and 20 other locomotives. There were 657.9 miles of main-line track and 333.6 miles of working-section track. In addition, 477 mother conveyors (74 more than in 1963), each averaging 1,468 feet, carried large tonnages. Not included with the 477 mother conveyors was the large number of room and gathering conveyors in use. Intermediate underground haulage in addition to the room and gathering conveyors, was by 970 cable-reel and 12 battery shuttle cars, plus 32 small shuttle buggies.

There were 18 fatal and 1,035 nonfatal injuries in the bituminous coal industry, compared with 22 fatal and 959 nonfatal in 1963. Injury rates were 0.37 fatal and 21.53 nonfatal per million man-hours of exposure and 0.23 fatal and 13.29 nonfatal per million short tons mined. Even with 45 more nonfatal injuries in 1964, the injury rate decreased because of increased production and employment. In 1964 an average of 27,000 men worked an average of 220.0 days, totalling 48.1 million man-hours. This was an increase of 600 men, working an additional 11.3 days and 3.8 million man-hours more than in 1963. These injury rates are well below the national average of 0.90 fatal and 41.86 nonfatal per million man-hours, and 0.45 fatal and 20.93 nonfatal per million tons mined. Of the fatal injuries, 14 occurred underground, 2 at surface facilities associated with underground

mines, and 2 at strip mines. Of the underground fatalities, eight were caused by falling roof; one was caused by falling face or rib; three died in haulage accidents; and two were killed in accidents involving machinery. The two strip fatalities were caused by haulage equipment and other machinery.

Washington County was the leading coal producing area followed by Greene, Cambria, and Clearfield.

Issuance of contracts for construction of the power-generating station at the Keystone mine mouth initiated the beginning of a building program which was expected to stimulate mining employment in the Johnstown-Indiana area. Coal from the Keystone mine will be consumed at the powerplant at the rate of 5.5 million tons annually when full operation is reached in 1968.[2] Power will be sent through extra-high voltage transmission lines to major power markets in the East. Aerial photography was being used to plot the best route for the transmission lines. Duquesne Light Co. and the Allegheny Power System jointly plan a giant mine-mouth powerplant on the Monongahela River in Pennsylvania and West Virginia. Five of the seven utility companies sponsoring the Keystone complex are planning a similar facility, called the Conemaugh plant, northwest of Johnstown and 27 miles from the Keystone mine.

A new concept in railroading has been started, using equipment owned by an investor-owned electric utility to transport fuel from origin to destination on a rigid schedule. Pennsylvania Power and Light Co., the owner of the unit train, loads at the Marion mine of the Tunneltown Mining Co., Tunneltown. The train of 74 cars, having a capacity of 7,000 tons, can be loaded in less than 3 hours and unloaded in one 8-hour shift. Empty cars can be returned to their point of origin in 2 days, compared with the former 12 to 20 days. Ultimate plans of the company included four such trains.[3] The Robinson mine of North American Coal Corp. at Seward was being expanded to accommodate a unit tram, having facilities capable of loading 8,000 tons in 4 hours. PBS Coals, Inc., also announced plans to develop a mine for unit-train shipment of utility coal from the mine in Somerset County, to Washington, D.C., and Syracuse, N.Y.

Power industry experts agreed that the cost differentials among the alternate methods for generating and supplying energy for Eastern markets have narrowed considerably since 1960. The economic advantages of (1) mine-mouth power generation and long distance extra high voltage transmission, (2) unit-train coal transportation to powerplants in the market areas, and (3) nuclear power generation in the load centers have become more difficult to assess.

Coke and Coal Chemicals.—The continued high level of activity in the iron and steel industry required larger quantities of coke, and the coke industry responded with output of 17.6 million tons of oven coke—15 percent more than in 1963. Twelve plants continued in operation, but only 3,662 ovens were in use; 58 ovens less than in 1963. Beehive coke output increased 46 percent to 562,000 tons. Eighteen beehive coke plants with 3,800 ovens were in operation, the same number of

[2] Mining Congress Journal. V. 50, No. 4, April 1964, p. 125.
[3] Skillings Mining Review. V. 53, No. 29, July 18, 1964, pp. 1, 6–7.

TABLE 4.—Coal (bituminous) production by counties

(Thousand short tons and thousand dollars)

County	1963		1964	
	Quantity	Value	Quantity	Value
Allegheny	4,436	$23,876	4,833	$26,170
Armstrong	4,150	16,420	4,320	18,280
Beaver	452	1,476	494	1,685
Bedford	317	1,099	285	994
Blair	13	59	11	54
Bradford	W	W	W	W
Butler	1,902	6,964	1,827	6,745
Cambria	6,955	37,575	8,741	48,202
Cameron	68	265	W	W
Centre	759	2,547	601	2,199
Clarion	3,711	12,717	3,175	11,052
Clearfield	6,890	25,080	7,288	26,681
Clinton	481	1,588	482	1,695
Elk	673	2,443	440	1,530
Fayette	1,500	7,410	1,834	10,562
Greene	9,615	59,373	11,588	71,620
Huntingdon	53	180	68	223
Indiana	5,588	25,968	5,509	24,657
Jefferson	1,802	6,326	1,891	6,683
Lawrence	897	2,772	841	2,529
Lycoming	29	115	W	W
Mercer	982	3,719	587	2,271
McKean	W	W	22	78
Somerset	3,120	11,873	3,168	14,184
Tioga	386	1,727	W	W
Venango	678	2,332	491	1,977
Washington	12,153	76,836	13,460	85,064
Westmoreland	3,857	19,164	4,081	20,971
Undistributed	34	181	494	2,112
Total	71,501	350,085	76,531	388,218

W Withheld to avoid disclosing individual company confidential data.

plants, but 164 more ovens; 136 ovens were abandoned, but 300 new or rebuilt ovens were put into operation. Oven-coke production comprised 29 percent of the National total and the State was ranked first in coke output, having production more than twice that of the next ranked State (Indiana). More than 95 percent of the coke produced, was consumed by the producing company in blast furnaces, and a much smaller quantity was consumed in foundries. The balance was sold chiefly to blast-furnace plants.

Value of oven-coke production was $299.4 million, an average value at the plant of $17.02—reflecting an increase of $2.11 per ton over that of 1963. Value of beehive-coke production was $7.6 million, an average of $13.48 per ton at the plant.

Total coal receipts for oven-coke production was 26.1 million tons, of which 73 percent was high volatile, 21 percent was low volatile, and 6 percent was medium volatile. Average value of the coal carbonized, was $8.09 per ton, a decrease of $0.36 per ton from that of 1963.

To produce 1 ton of coke, 1.44 tons of coal was carbonized, the same as in 1963. At the beehive ovens, 1.63 tons of coal was required to produce 1 ton of coke. Of the 25.3 million tons of bituminous coal carbonized at slot-oven plants, all but 363,000 tons was washed; and at the beehive plants, 165,000 tons was unwashed (18 percent of the total). Of the coal received at oven-coke plants, 14.2 million tons

originated in Pennsylvania; 10.3 million tons, in West Virginia; 1.2 million tons, in Virginia; and 441,000 tons, in Kentucky.

Coke-breeze production in 1964 was 863,000 tons, 17 percent more than in 1963. Of total coke breeze produced, 71 percent was consumed by the producer, mostly in agglomerating and steam plants, and the balance was sold.

More than 272.5 billion cubic feet of coke-oven gas was produced—10,770 cubic feet per ton of coal coked. Of this total, 107.0 billion cubic feet was used in heating ovens; 163.8 billion cubic feet was sold; and the balance was wasted.

Recovered products at the oven-coke plants, in addition to the coke breeze and coke-oven gas, included 246,309 tons of ammonium sulfate equivalent; 241.1 million gallons of coke-oven tar; 75.6 million gallons of crude light oil, from which were derived 40.7 million gallons of benzene; 10.6 million gallons of toluene; 3.6 million gallons of xylene, and 2.9 million gallons of solvent naphtha.

Natural Gas Liquids.—Output of natural gas liquids was 62,357 barrels; a 14 percent reduction from that of 1963. Of the total, 43 percent was natural gasoline; the balance was other liquefied petroleum gases. The value of natural gas liquids produced was $164,000, 16 percent less than that of 1963. Prices of natural gasoline and liquefied petroleum gases were 5.6 cents and 6.8 cents per gallon, respectively.

As of January 1, 1964, five natural gas processing plants were in operation of which three were absorption and two were compression. Daily capacity of these plants was 17,450 gallons, of which 3,000 gallons was liquefied petroleum-gas mixtures, and 14,450 gallons was natural gasoline and other products. Most of this capacity was recovered by the absorption (16,500 gallons) and the balance by the compression process.

Reserves of natural gas liquids were estimated to be 1.38 million barrels, 4 percent less than the estimate made at the end of 1963.

Peat.—Sales of peat were 16 percent greater than in 1963. Ten producers were active in six counties. Average price per ton increased by $0.08 to $10.05. Luzerne County yielded the largest peat output, followed by Wayne County. Of total output, 42 percent was humus peat; the balance was almost evenly divided between moss and reed-sedge peat. Peat-mining activity involved 428 acres, 96 acres more than in 1963.

Petroleum and Natural Gas.—Production of crude oil was 5.1 million barrels valued at $22.1 million, a slight increase from that of 1963. However, because of decreased prices for petroleum at the wellhead, total value decreased 5 percent. According to the Oil and Gas Section, Pennsylvania Bureau Topographic and Geologic Survey, the wellhead price of Pennsylvania crude from the Bradford district, which comprised 60 percent of total petroleum production, was $4.48 per barrel. The balance of output, which is comprised of Pennsylvania crude from the Middle and Southwest districts, averaged $4.10 per barrel. Total natural gas production was 82.7 billion cubic feet of which 82.2 billion cubic feet was marketed for $22,349,000, an 11-percent decline in marketed production, causing a loss of $1.7 million in natural gas

revenues from that of 1963. The average price of natural gas was $0.27 per thousand cubic feet.

Drilling in proven areas resulted in 619 development wells, compared with 489 in 1963. This new drilling resulted in 242 oil wells, 274 gas wells, and 103 dry holes. Secondary recovery projects resulted in drilling 278 wells. Thirteen additional wells were drilled for gas storage, and one was drilled for waste disposal. Of the 27 wildcat tests, 6 resulted in gas discoveries; a success rate of 22 percent, compared with 29 percent in 1963. The grand total of 911 development wells, 27 wildcats, and 27 old wells drilled deeper resulted in 2.2 million feet of drilling. The average depth of the wildcat holes was 6,478 feet or 536 feet deeper than that of 1963. At the end of 1964, it was estimated that there were 53,065 producing oil wells and 13,520 producing gas wells, yielding a daily average of 0.27 barrel of oil and slightly less than 17,000 cubic feet of gas per day, per well, respectively.

The trend to hydraulic stimulation of both oil and gas wells continued. Both primary producing wells and wells in secondary recovery projects benefited from this technique. The success of notching and selective fracturing was a major factor in the recent increase in drilling shallow sand wells. In the Youngsville-Sugar Grove Field in Warren County, 114 new oil wells were completed. In the New Bethlehem area of Clarion County and the Pleasantville area in Venango and Forest Counties, daily production increased significantly. Three secondary recovery projects using steam injection were under way in the Tidioute and Bradford areas, and a feasibility test was under way for the area near Franklin.

One of the outstanding exploratory developments during 1964 was the discovery of commercial quantities of natural gas in the Cambrian Gatesburg formation in Crawford County. A discovery well drilled in Fayette County in 1937 to the Summit field was deepened to the Silurian Tuscarora Sandstone, and at total depth of 11,571 feet was the deepest producing well in the State. The Kastle pool in the Conneaut field, Crawford County, discovered in 1962, has 48 shut-in gas wells. Upon completion of a gathering pipeline system (expected in 1965), production likely will develop.

An interesting but noncommercial gas strike was made near Prosperity. At a depth of 500 feet, drillers encountered a flow of gas estimated from 10 to 15 million cubic feet per day. Because of the shallow depth it was believed the reserve would prove to be inadequate to justify a completion and the well was capped.[4]

Ten companies operated natural gas storage facilities in more than 30 fields in 14 counties in Pennsylvania and in contiguous areas in the adjacent States of New York and West Virginia. Some of the larger operating companies were Equitable Gas Co., Manufacturers Light & Heat, and People's Natural Gas Co., all having large storage capacity mainly in southwestern Pennsylvania. Others were Consolidated Gas Supply Corp. (formerly New York State Natural Gas Corp.), Tennessee Gas, Texas Eastern, Transcontinental Gas Pipe Line Corp., and United Natural Gas Co. having most of their storage capacity in the northwestern and west central part of the State. Total gas storage

[4] Bulletin of the American Association of Petroleum Geologists. V. 49, No. 6, June 1965, pp. 666–672.

capacity of the State was estimated to be 666.7 billion cubic feet.[5] The American Gas Association estimated that 521.5 billion cubic feet were in storage at yearend, compared with 491.2 billion cubic feet in storage at the end of 1963.

Thirteen petroleum refineries were in operation in 1964. Total operating capacities in barrels per day included 619,000 barrels of crude oil, a catalytic cracking capacity charge of 253,000 barrels, a thermal cracking capacity charge of 68,000 barrels, and a reforming capacity charge of 137,000 barrels.

The reserve of crude oil as of December 31 was estimated by the American Petroleum Institute to be 86.6 million barrels, 5.1 million barrels less than in 1963. The American Gas Association estimated the reserve of natural gas to be 1,243.6 billion cubic feet, 29.1 billion cubic feet more than on December 31, 1963, based on standard conditions of 14.73 pounds per square inch absolute pressure and 60° F.

NONMETALS

Cement.—Portland cement production was 2 percent less than that of 1963, but masonry cement output increased 12 percent. Average price per barrel for portland cement continued to decline, dropping $0.07 per barrel to $3.01. Average price for masonry cement, however, increased $0.07 to $2.70 per barrel. The downward trend in shipments of portland cement, particularly in eastern Pennsylvania, reflected the continuing highly competitive market along the Atlantic seaboard.

Portland cement capacity was 52.4 million barrels, almost 1.5 million barrels less than in 1963. Twenty-one plants were in operation, of which 16 were in eastern and 5 were in western Pennsylvania. Of total capacity 63 percent was of the dry process and 37 percent of the wet process. Electrical energy used by the cement industry totaled 967.4 million kilowatt-hours of which 84 percent was purchased. The balance was generated by the companies. Cement stocks as of December 31 were 5.7 million barrels, compared with 5.8 million barrels in 1963 and 6.0 million barrels at the end of 1962.

Portland cement shipments were to ready-mixed concrete companies (58 percent), concrete product manufacturers (20 percent), building-material dealers (12 percent), and highway contractors (7 percent). The balance was shipped to other contractors, Government agencies, and miscellaneous consumers. Pennsylvania cement was shipped to consumers in 45 States and several foreign countries.

Lost markets for the State cement output were mostly in the New England area. Other decreased markets were noted in New Jersey, New York, Delaware, and along the Atlantic seacoast into South Carolina. Consumption within the State increased significantly, and new markets were developed in the adjoining States of Ohio, Maryland, and West Virginia. Of total shipments 39 percent was consumed in Pennsylvania, 21 percent in New Jersey, 14 percent in New York, 8 percent in Ohio.

Tons of raw materials consumed in producing portland cement included cement rock, 7.6 million tons; limestone, 3.3 million; shale,

[5] Oil and Gas Journal. V. 63, No. 18, May 3, 1965, pp. 138–144.

128,000; clay, 99,000; sand, 219,000; slag, 180,000; gypsum, 326,000; and iron ore, 37,000. Air-entraining compounds included Vinsol resin and Airalon.

Of total shipments 62 percent was shipped by truck and 37 percent by rail. The balance was shipped by boat or used at the plant.

Most of the shipments were in bulk form (83 percent). Of the remainder, 16 percent was shipped in paper bags and 1 percent in other containers.

TABLE 5.—Portland cement shipments, by counties

County	Number of plants in 1964	1963		1964	
		376-pound barrels	Value	376-pound barrels	Value
Lehigh	4	6,566,840	$18,954,773	6,030,959	$16,027,656
Northampton	9	18,816,439	56,104,232	17,857,155	51,362,025
Allegheny	2	6,714,204	21,995,863	7,633,528	25,046,654
Lawrence	2				
Berks	1	6,218,726	21,147,992	6,141,121	20,972,499
Butler	1				
Montgomery	1				
York	1				
Total	21	38,316,209	118,202,860	37,662,763	113,408,834

Clays.—Output of clay was at virtually the same rate as that of 1963. Value of output, however, increased by $1.1 million mainly because of higher values per ton assigned to miscellaneous clay. Clay output (excluding kaolin) was distributed roughly one-half fire clay and one-half miscellenous clay. Production of clay refractories was the highest since 1960. Output of firebrick and fireblock was less than that of 1963, but a tenfold increase in production of high-alumina brick offset this loss. In addition, output for refractory mortar, for bulk use in foundries and steelworks, and miscellaneous refractory uses all increased. Clay consumption in production of building brick and other heavy clay products—mostly miscellenous clay (68 percent)—increased 5 percent from 1963. Diminished lightweight aggregate production resulted in consumption of less than half as much clay as was used for this purpose in 1963. Clay consumption in the manufacture of portland cement and the production of pottery and flowerpots was at virtually the same rate as that of 1963.

Clay was produced in 32 counties; the leading areas were Lawrence, Clearfield, Armstrong, Berks, and Jefferson. Lower production in Clearfield County (the former leading area for clay production) brought about a change in first ranking as Lawrence County assumed this position. However, the value of Clearfield County's clay output was over four times greater than that of Lawrence County because of the higher priced fireclay produced in that county. Because of the low value assigned to the miscellaneous clay produced in Lawrence County, it was ranked 11th in value of output.

Gem Stones.—Mineral specimens were collected chiefly by hobbyists and amateur lapidarists at scattered locations in the eastern part of the State but centered chiefly in Chester and Montgomery Counties. Gem stones collected in Chester County at the Cornog quarry, included black quartz (containing red garnet), pink calcite, and zoisite in

TABLE 6.—Clays sold or used by producers, by kinds and uses [1]

(Short tons)

Use	Fire clay		Miscellaneous clay	
	1963	1964	1963	1964
Refractories:				
Firebrick and block	783,272	735,106		
Fire clay mortar	20,672	43,306		
Heavy clay products	557,945	605,062	1,267,538	1,308,816
Portland and other hydraulic cements			199,275	198,358
Undistributed	[2] 142,681	[2] 200,639	[3] 219,222	[3] 95,813
Total	1,504,570	1,584,113	1,686,035	1,602,987

[1] Excludes Kaolin.
[2] Includes rubber (1963), paint (1963), exports (1964), floor and wall tile, high-alumina brick, clay crucibles, foundries, steelworks (bulk), other refractories, insecticides and fungicides, other filler, absorbent uses, and other uses.
[3] Includes art pottery, flowerpots, and glaze slip; foundries, and steelworks (bulk); lightweight aggregate; linoleum and oilcloth; and other uses (1963).

TABLE 7.—Clays sold or used by producers in 1964, by counties

County	Short tons	Value	Types of clay
Adams	79,960	$39,950	Miscellaneous clay.
Armstrong	255,970	1,963,285	Fire clay, miscellaneous clay.
Beaver	117,483	929,290	Do.
Bucks	59,900	59,900	Miscellaneous clay.
Butler	9,028	13,500	Do.
Cambria	32,818	163,955	Fire clay, miscellaneous clay.
Chester	97,153	121,500	Miscellaneous clay.
Clarion	73,743	309,470	Fire clay, miscellaneous clay.
Clearfield	435,177	2,784,784	Do.
Clinton	W	44,717	Do.
Columbia	15,868	28,500	Miscellaneous clay.
Fayette	102,836	W	Fire clay, miscellaneous clay.
Greene	1,500	1,900	Miscellaneous clay.
Lawrence	460,925	642,340	Fire clay, miscellaneous clay.
Montgomery	57,629	103,286	Miscellaneous clay.
Somerset	110,630	878,242	Fire clay.
Undistributed [1]	1,276,540	7,729,324	
Total [2]	3,187,100	15,813,943	

W Withheld to avoid disclosing individual company confidential data.
[1] Includes Allegheny, Berks, Blair, Centre, Cumberland, Dauphin, Huntingdon, Indiana, Jefferson, Lancaster, Luzerne, McKean, Monroe, Northumberland, Schuylkill, and York Counties, and counties indicated by symbol W.
[2] Incomplete total; excludes Kaolin produced in Blair and Cumberland Counties.

quartz. Gems collected at the Bessemer quarry included zeolites, stilbite, hevlandite, and pyrite. At the Kibblehouse quarry specimens collected included calcite (fluorescing red, blue white, and cream), calcite crystals, garnet, epidote; at the Audubon mine sphalerite, barite chalcopyrite, and mulfenite were collected.

Graphite.—Manufactured (artificial) graphite was produced in an electric graphetizing plant near St. Marys in Elk County. Output in the form of graphite electrodes and anodes were sold to the iron and steel and the chemical industries.

Gypsum.—A gypsum calcining plant was operated at Philadelphia using both domestic and imported crude gypsum.

Iodine.—Two companies consumed out-of-State crude iodine in the production of both inorganic and organic sulfur compounds. One plant was at Pittsburgh in Allegheny County and one at Myerstown in Lebanon County.

Iron Oxide Pigments.—A small quantity of crude iron oxide pigment materials (red iron oxide and yellow sulfur mud) was mined.

The State continued to rank first in output of finished iron oxide pigments. Output was 4 percent more than in 1963. The leading type of pigment produced was the manufactured pure red iron oxides. Large quantities of natural brown iron oxides also were finished. Other types included the manufactured and natural yellows, manufactured browns, and manufactured and natural magnetic blacks. One plant in Carbon County and two in Northampton were in operation in 1964.

Lime.—The market for chemical and industrial lime was very active as consumption by these industries was more than 250,000 tons greater than in 1963. A major portion of this increase was attributed to a strong demand for lime in steel furnaces. Most of the other major markets remained at virtually the same rate as that of 1963. Most of the output (81 percent) was quicklime. Eighteen plants were operated in 15 counties. Centre County with three large lime-producing companies was, by far, the first ranking area followed by Lebanon, York, Butler, and Chester Counties. State lime-burning capacity was more than 1.8 million tons. Kilns in use included 17 rotary, 25 pot, and 11 shaft. Regenerated lime was recycled at one paper plant. Almost two-thirds of the lime output was consumed within the State, but shipments were made to 22 States, Canada, Chile, and Venezuela. Maryland, New York, New Jersey, and Ohio were leading States of destination.

TABLE 8.—Lime sold by producers, by counties

County	1963		1964	
	Short tons	Value	Short tons	Value
Armstrong	327	$4,905	310	$4,371
Centre	576,346	7,577,065	767,948	9,716,998
Dauphin	7,500	120,000	7,800	132,600
Lancaster	W	W	560	5,066
Lebanon	150,000	2,182,000	204,000	2,812,000
Mifflin	W	W	4,023	36,705
Northumberland	325	2,925	355	3,200
Undistributed [1]	453,719	7,661,045	455,289	7,945,084
Total	1,188,217	17,547,940	1,440,285	20,656,024

W Withheld to avoid disclosing individual company confidential data.
[1] Includes Bedford, Butler, Chester, Juniata, Montgomery, Snyder, Westmoreland, and York Counties, and counties indicated by symbol W.

Mica.—Flake mica was produced by General Mining Associates at the Hoke mine, near Glenville. Output, which increased over that of 1963, was sold to manufacturers of paint, welding rods, and rubber products.

Perlite (Expanded).—Crude perlite shipped from Colorado was ex-expanded at six plants in five counties. Allegheny County led in perlite output. Sales of the expanded product were slightly less than in 1963. The leading use was for lightweight aggregate in building plaster. Other uses included concrete aggregate and filler. Average price increased by $2.00 to $62.00 per ton.

Pyrites.—Pyrite was recovered by flotation in the milling process for

magnetite iron ore at the Grace and Cornwall concentrators. Output increased 15 percent from 1963. The concentrate was shipped for consumption at the company sulfuric acid plant in the iron and steel complex at Sparrows Point, Md.

Sand and Gravel.—Production of sand and gravel resumed its upward climb after a year of decreased output, increasing by more than 2.1 million tons (15 percent) from 1963. Of total commercial output, 60 percent was sand, and 40 percent was gravel. The aggregate market consumed 85 percent of total commercial tonnage of which building aggregate comprised 7.8 million tons and paving aggregate 5.8 million tons. Almost all the markets for sand and gravel increased, but the major tonnage increases were in paving (1.3 million tons) and building (0.6 million tons). Industrial sands played a prominent role in that the value of the State sand and gravel industry because of its high unit value, usually about twice that of aggregate production. Leading among the industrial sand uses were glass, grinding and polishing, fire or furnace, and engine. Ground sand production increased significantly but the average price per ton decreased more than 10 percent.

Bucks was the leading county for sand and gravel output followed by Erie, Westmoreland, Beaver, Huntingdon, and Mercer. Huntingdon County was the leading area for ground and industrial sand. All told, 108 commercial companies operated 115 pits in 47 counties. A dredge which had operated on the Allegheny River in Armstrong County moved down river into Westmoreland County and caused a sudden shift in source of a major tonnage. Of total output 98 percent was washed, screened, or otherwise prepared. Transportation was mostly by truck (67 percent) and waterway (26 percent); the balance by railroad and other disposition. A small amount of Government-and-contractor sand and gravel also was produced.

Stone.—Production of stone increased 7 percent and value of production increased 9 percent from that of 1963. Principal factors contributing to the stimulated mineral activity were increased limestone production for flux, increased sales of sawed and dressed dimension sandstone, a firm market for crushed basalt and crushed miscellaneous stone for aggregate and roadstone, new output of crushed slate for lightweight aggregate, and increased slate output for roofing material.

Increased production was reported for all types of crushed stone except granite. The greatest amount of increase was for dimension sandstone but output of dimension basalt and dimension slate also was greater than that of 1963.

The leading type of stone produced was limestone, comprising 83 percent of tonnage and 72 percent of value. The stone types produced, showing respective tonnage and value rankings in parentheses, were limestone (first in both), basalt (second and third), sandstone (third and second), miscellaneous stone (fourth and fifth), granite (fifth and sixth), and slate (sixth and fourth).

The major crushed stone markets were for concrete aggregate and roadstone (55 percent), cement manufacture (21 percent), and blast-and-open-hearth flux (11 percent). Other uses for crushed stone included agstone, railroad ballast, refractory products, and roofing granules. To summarize, the leading crushed stone markets for limestone were aggregate, cement manufacture, and flux; for sandstone, aggre-

TABLE 9.—Sand and gravel sold or used by producers, by classes of operations, and uses

(Thousand short tons and thousand dollars)

Class of operation and use	1963		1964	
	Quantity	Value	Quantity	Value
Commercial operations:				
Sand:				
Molding	122	$378	124	$396
Building	4,261	6,301	4,697	6,648
Paving	2,298	3,188	2,859	4,109
Fire or furnace	168	382	108	326
Fill	39	29	24	25
Undistributed [1]	1,533	4,914	1,818	5,382
Total	8,421	15,192	9,630	16,886
Gravel:				
Building	2,931	4,313	3,137	4,550
Paving	2,278	3,666	2,978	4,507
Fill	153	89	207	138
Undistributed [2]	206	228	217	276
Total	5,568	8,296	6,539	9,471
Total sand and gravel	13,989	23,488	16,169	26,357
Government-and-contractor operations:				
Sand: Other	27	33	26	33
Gravel:				
Paving	50	18		
Other			4	24
Total sand and gravel	77	51	30	57
Total all operations:				
Sand	8,448	15,225	9,656	16,919
Gravel	5,618	8,314	6,543	9,495
Grand total	14,066	23,539	16,199	26,414

[1] Includes glass, grinding and polishing, blast, engine, filter (1963), railroad ballast (1963), ground, and other sand.
[2] Includes railroad ballast, miscellaneous, and other gravel.

gate and roofing granules; for basalt, granite and miscellaneous stone and aggregate; and for slate, roofing granules, and flour.

The leading dimension stone industries, in terms of value were slate (66 percent) and sandstone (23 percent). Leading market for dimension stone (excluding slate) were the various types of building stone. A significant quantity of curbing and flagging also was produced. The larger markets for dimension slate were for structural and sanitary ware, blackboards, and roofing material.

Crushed stone was produced at 223 quarries of which 157 were limestone, 37 sandstone, 17 basalt, 5 slate, 5 miscellaneous stone, and 2 granite. Dimension stone was quarried at 65 quarries of which 41 were sandstone, 10 slate, 5 miscellaneous stone, 4 basalt, 4 granite, and 1 limestone. These quarries will not add to a grand total for the State since dimension and crushed stone were sometimes obtained from the same quarry.

The leading stone-producing counties listing the principal types of stone in parentheses, were Northampton (limestone and slate); Montgomery (limestone and miscellaneous stone); Adams (limestone and sandstone); Berks (limestone and basalt); Lawrence (limestone); Bucks (limestone, basalt, and miscellaneous stone); and York (limestone).

Roofing granules were produced at three plants, one each in Adams, York, and Beaver Counties.

TABLE 10.—Sand and gravel sold or used by producers, by counties

(Thousand short tons and thousand dollars)

County	1963		1964	
	Quantity	Value	Quantity	Value
Allegheny	234	$399	W	W
Armstrong	1,416	3,103	477	$787
Beaver	775	1,065	854	1,170
Bedford	7	18		
Berks	59	86	W	W
Bradford	113	140	W	W
Butler	149	202	164	219
Clearfield	27	33	W	W
Clinton			4	24
Crawford	114	133	92	108
Cumberland	212	309	250	376
Erie	1,401	1,988	1,613	2,086
Fayette	60	131	51	114
Lackawanna	234	237	261	288
Lancaster	205	384	229	446
Luzerne	465	548	631	754
McKean	10	10	10	10
Mercer	323	449	735	889
Montgomery	1	14	6	12
Northampton	449	551	486	602
Schuykill	122	258	124	257
Snyder	128	134	162	185
Warren	210	319	261	412
Wayne	17	23	132	178
Undistributed [1]	7,338	13,007	9,657	17,497
Total	14,066	23,539	16,199	26,414

W Withheld to avoid disclosing individual company confidential data.
[1] Includes Blair, Bucks, Cambria, Carbon, Clarion, Columbia, Dauphin, Elk, Forest, Franklin, Fulton, Huntingdon, Jefferson, Lawrence, Lycoming, Mifflin, Monroe, Montour, Philadelphia, Somerset, Tioga (1964), Venango, Westmoreland (1964), Wyoming, and York Counties, and counties indicated by symbol W.

TABLE 11.—Stone sold or used by producers, by uses

Use	1963		1964	
	Short tons	Value	Short tons	Value
Dimension stone:				
Building stone	132,623	$1,324,393	121,921	$1,340,151
Curbing and flagging	38,604	884,090	43,964	1,163,893
Other uses [1]	29,152	3,548,153	31,086	3,654,579
Total	200,379	5,756,636	196,971	6,158,623
Crushed and broken stone:				
Riprap	W	W	9,463	20,039
Concrete and roadstone	28,425,086	41,027,731	28,983,140	42,279,571
Furnace flux (limestone)	4,788,866	8,791,840	5,885,117	10,375,887
Railroad ballast	483,395	733,264	486,989	742,077
Refractory	131,214	1,445,489	W	W
Agricultural	1,089,748	3,255,974	1,000,054	3,104,776
Other uses [2]	14,417,088	22,439,139	16,267,534	28,393,707
Total	49,335,397	77,693,437	52,632,297	84,916,057
Grand total	49,535,776	83,450,073	52,829,268	91,074,680

W Withheld to avoid disclosing individual company confidential data.
[1] Includes roofing slate and millstock.
[2] Includes riprap (1963) and refractory (1964).

TABLE 12.—Stone sold or used by producers, by counties

County	1963		1964	
	Short tons	Value	Short tons	Value
Adams, Cumberland	3,692,006	$7,452,253	4,137,126	$10,847,874
Armstrong	W	W	185,813	431,532
Berks	3,192,310	4,083,477	3,396,066	4,578,911
Blair, Huntingdon	1,383,193	2,373,561	1,489,990	2,567,420
Bucks	2,859,489	5,117,736	3,160,124	4,223,338
Butler	1,082,807	2,087,679	1,289,182	2,467,851
Cambria	2,700	8,100	W	W
Carbon, Monroe, Schuylkill	708,597	1,854,051	928,550	2,364,168
Centre	2,068,603	3,770,312	2,432,183	4,259,858
Chester	2,133,717	3,888,616	2,449,119	5,073,218
Dauphin	1,026,014	1,499,608	988,084	1,616,504
Erie	140	225		
Fayette, Somerset	1,529,179	2,937,153	935,980	1,832,068
Franklin	1,042,780	1,360,517	W	W
Juniata, Mifflin, Snyder	691,999	1,102,674	888,606	1,249,631
Lackawanna	136,986	272,114	W	W
Lancaster	3,094,198	4,380,148	2,948,392	4,181,751
Lawrence	2,601,792	4,348,166	3,199,749	4,345,289
Lebanon	1,436,793	2,444,595	1,698,035	2,867,643
Lehigh	2,297,556	2,154,027	2,533,795	2,624,085
Montgomery	4,189,420	6,694,731	4,679,418	7,671,742
Northampton	4,885,758	8,396,007	5,341,525	8,427,109
Northumberland	56,150	99,600	55,410	97,810
Potter	8,702	254,751	W	W
Susquehanna	W	W	170,896	745,587
Wayne	117,607	185,807	157,408	330,176
Westmoreland	741,910	1,289,389	667,021	1,167,469
York	3,108,776	6,268,751	3,074,191	6,617,425
Undistributed [1]	5,446,594	9,126,025	6,022,605	10,486,221
Total	49,535,776	83,450,073	52,829,268	91,074,680

W Withheld to avoid disclosing individual company confidential data.
[1] Includes Allegheny, Bedford, Clarion, Clinton, Delaware, Elk (1964), Fulton, Jefferson, Luzerne, Lycoming, McKean (1964), Mercer, Montour, Perry, Tioga, Union, Washington, and Wyoming Counties, and counties indicated by symbol W.

Sulfur.—Sulfur and hydrogen sulfide were recovered in liquid purification of oil refinery gases. Sulfur was recovered at three refineries in the eastern part of the State at virtually the same rate as that of 1963. Hydrogen sulfide, recovered at another refinery, was converted directly into sulfuric acid.

Talc.—Sericite schist, resembling talc mineralogically and suitable for many of the same uses because of similar chemical and physical properties, was mined by three companies in Adams County. Crude production was almost one-third greater than that of 1963. One of the companies, Mauna Mining Co., went out of business in November 1964, reportedly for economic reasons. The entire output was ground at company mills and sold. The largest market by far was for asphalt filler. Other uses included joint cement, insecticides, and roofing.

Tripoli.—Total sales of tripoli (rottenstone) were at virtually the same rate as that of 1963. Two companies in Lycoming County mined and processed the material for use as an abrasive compound and as a filler material.

Vermiculite (Exfoliated).—Production of exfoliated vermiculite was almost identical with that of 1963. Two plants were in operation, one in Bucks County and one in Lawrence County. The largest use by far was for insulation. Other uses included agriculture, as a lightweight aggregate in concrete and plaster, and as a packing medium.

METALS

Beryllium.—Beryllium metal, alloys, and compounds were produced from beryl by the Beryllium Corp. at plants at Reading and Hazleton. Litigation against the company by residents near the America plant near Reading, began because of lung infection believed to have been caused by the emission of toxic beryllium dust into the atmosphere, resulted in a decision against the company and the awarding of a significant cash settlement to the litigants.

Cadmium.—St. Joseph Lead Co. recovered cadmium from sintering machine fume at its Josephtown plant in Beaver County. Equipment designed for recovery of cadmium had been installed in 1937. Cadmium also was recovered at the Palmerton plant of New Jersey Zinc Co.

Cesium-Rubidium.—Penn Rare Metals, Division of Kawecki Chemical Co., processed pollucite to cesium metal and compounds at Revere. This firm also produced rubidium compounds. Rare Metals Derivatives, Inc., processed pollucite to cesium compounds at Ambler.

Cobalt.—Pyrite concentrate from Pennsylvania magnetite iron ore was processed at plants at Sparrows Point, Md., and Wilmington, Del., to recover its cobalt metal content. Cobalt production increased significantly from that of 1963.

Copper.—The recovery of copper from flotation concentrate decreased from that of 1963. More concentrate was produced, but the copper content was significantly lower than that of 1963.

Ferroalloys.—Both production and shipment of ferroalloys increased from 1963. Shipments amounted to 586,000 tons valued at $100.9 million. Thirteen types of ferroalloys were produced, however, ferromanganese comprised a major portion (92 percent) of this total. Of the balance, spiegeleisen and ferromolybdenum were the more important types.

United States Steel Corp. was transforming its Clairton pig-iron blast furnace to produce ferromanganese. Output was to be shipped to the company Duquesne Works for use in open-hearth furnaces to produce various alloy steels.

Germanium.—Kawecki Chemical Co., Boyerstown, acquired the Penn Rare Metals, Inc., Revere, and will operate the firm as a wholly owned subsidiary. Products of the plant will be germanium, cesium, rubidium, tellurium, and other high-purity metals.[6]

Gold and Silver.—Production of gold and silver was virtually the same as in 1963. Output was recovered from the copper concentrates prepared in the milling of iron ore.

Iron Ore.—Responding to the firm demand for iron and steel, shipments of iron ore were 10 percent greater than in 1963. Magnetite, produced from the Cornwall and Grace underground mines, was crushed, concentrated by magnetic separation, and pelletized at agglomerating plants at the mine sites. Most of the agglomerates were shipped to company-owned iron and steel plants and were consumed in blast furnaces.

Iron and Steel.—The continuing vigorous economy was reflected

[6] Chemical and Engineering News. V. 42, No. 7, Feb. 17, 1964, p. 30.

in increased production of pig iron and steel. Pig iron output increased from 17.3 to 21.0 million tons, and according to the American Iron and Steel Institute, steel production increased from 25.2 to 30.5 million tons. For the first time, tonnages of steel produced by the basic oxygen method were published; 3.6 million tons was produced by basic oxygen furnaces in 1964. Most of the steel production (79 percent) was from open hearth furnaces, 24.0 million tons in 1964 total. The balance of steel outpnt was from Bessemer and electric furnaces.

Most of the pig iron produced was classed as basic. In order of production, the other classes were Bessemer, malleable, foundry, and low phosphorous. A small tonnage was made directly into castings. Receipts of U.S.-produced and foreign-produced iron ore were 42 percent and 28 percent, respectively, more than in 1963. Total closing stocks of iron ore were 11.3 million tons; a 286,000 ton increase over opening stocks. Of the total iron ore consumed, 50 percent was prepared by agglomeration, 45 percent was consumed directly in blast furnaces, and 5 percent directly in steel furnaces. Fluxes consumed by the iron and steel industry, included 3.7 million tons of limestone and 2.9 million tons of dolomite.

Other materials consumed included 1.4 million tons of mill cinder and roll scale, 1.0 million tons of raw flue dust, 1.8 million tons of steel furnace slag, 14.2 million tons of coke and coke breeze, more than 0.3 million tons of anthracite, 19.9 million tons of pig iron and hot metal, 11.1 million tons of home and purchased scrap, and 0.3 million tons of slag scrap.

Agglomerate consumption and transshipment to other plants totaled 25.5 million tons, of which more than half was U.S. sinter (regular); more than one-quarter was semi- and self-fluxing sinter. The balance of agglomerate consumption was comprised mostly of regular pellets, plus a smaller quantity of foreign agglomerates.

In operation of the iron and steel furnaces, 6.8 million tons of slag was produced; 0.9 million tons of flue dust was recovered; and more than 155,000 tons of scrap was produced. Nine companies operated 20 plants, 1 plant less than in 1963. The Birdsboro plant of Colorado Fuel and Iron, was closed indefinitely. Fifty blast furnaces were active, 13 more than in 1963.

Confidence in the growth of the national economy and in the role of steel in that growth, was reflected in construction of new steel plants and renovation and modernization of existing plants. Illustrating this optimism were the numerous reports of construction activity. Allegheny Ludlum was planning a major new steel-melting plant at Natrona. Equipment at the plant would include two oxygen converters for producing alloy steel, a hot-blast cupola, and the required auxiliary equipment. Jones & Laughlin Steel Corp. announced plans for future expansion of its Aliquippa works onto Corn Island. The area of the Ohio River between the island and the existing plant is to be filled, resulting in a 50-percent increase in acreage for future expansion of the plant. The channel on the other side of the island would be widened to permit barge traffic and to handle the extensive docking requirements of the company when the present docking area is lost in the filling operation. The company also announced plans

to build a new blast furnace, having a 2,500 ton capacity, at its Hazelwood works. Pittsburgh Steel Co. was planning the construction of a $3.5 million iron ore sintering plant with capacity of 500,000 tons of sinter per year. Armco Steel Corp. announced acquisition of 474 acres adjacent to its present plant site at Butler on which a new low-level continuous-casting unit likely will be built. The increased property holdings will provide the space needed for any additional expansion. The largest vacuum degassing unit in the world will be installed at the Pittsburgh (Hazelwood) works of Jones & Laughlin Steel Corp. Expectations were that the new furnace would improve the yield of steel ingots and lead to development of new steels. Lukens Steel Co. announced plans to add a new 145-ton electric furnace to its two 100-ton capacity furnace plants at Coatesville and eventually plans to retire all its open-hearth furnaces. Sharon Steel Co. will virtually double its steel production capacity with the planned addition of a third Kaldo oxygen furnace and pressure-casting equipment for producing stainless and high-alloy steels. These furnaces, scaled-up from a Swedish prototype, are the only rotating-oxygen furnaces in the Nation. Because of problems in finding a long-lived refractory lining, a specially designed high-temperature brick was developed and was performing satisfactorily. Capacity for basic-oxygen steelmaking in Pennsylvania was more than 4 million tons annually.

Iron and Steel Scrap.—To meet the requirements of accelerated steel products, significantly more iron and steel scrap was consumed than in 1963. Ferrous scrap was collected and prepared at scattered locations throughout the State but was centered in metropolitan areas, such as Pittsburgh, Philadelphia, and Harrisburg. The leading varieties of scrap consumed were No. 1 heavy-melting steel, No. 2 and all other bundles, cast-iron scrap and other borings, and No. 1 electric-furnace bundles.

Slag (Iron-Blast-Furnace).—Production of iron-blast-furnace slag was 6 percent more than that of 1963—6.2 million tons valued at $11.1 million. The State led in production of slag. Average price per ton of slag was $1.78, compared with the national average of $1.73. Of the total State slag output, 77 percent was screened air-cooled. Markets were for aggregate used in most types of construction activity.

Smelters.—The Josephtown and Palmerton smelters continued operation in 1964. The Josephtown plant of St. Joseph Lead Co., near Aliquippa in Beaver County, smelted zinc concentrates from its New York and Missouri operations and from other domestic and foreign sources. Output of the plant was zinc metal and oxide, cadmium, and sulfuric acid. The Palmerton complex of New Jersey Zinc Co. produced zinc and metal and oxide, cadmium, sulfuric acid, and anhydrous ammonia. Zinc concentrates and zinc crude from company-owned facilities plus other domestic and foreign material were processed.

Zinc.—Mine output of zinc was 12 percent more than that of 1963. Value of production increased 27 percent because of the higher price per pound commanded by zinc metal on the world market. The zinc ore concentrates were shipped to the company smelter at Palmerton.

REVIEW BY COUNTIES

Adams.—Output of crushed limestone at three quarries was nearly 500,000 tons more than that of 1963. Greater production of flux for blast-and-open hearth furnaces by Bethlehem Steel Co. at its new Hanover quarry was the leading factor in increased county production. Teeter Stone, Inc., and Gettysburg Limestone Products, Inc., produced crushed limestone for aggregate. Bethlehem Steel Co. installed a new stone-sand classifier and new screening equipment at the Hanover plant. Crushed basalt and quartzite was produced by the Ruberoid Co., mostly for roofing granules. The Hanover quarry of Bethlehem Steel Co. received a Certificate of Achievement in Safety for working throughout 1964 without a disabling work injury.

Sericite schist was produced by Summit Industries, Inc., at two open-pit mines near Mt. Hope and Bendersville. The crude material was trucked to the company mill at Aspers. After grinding, it was shipped for consumption as asphalt filler and in joint cement. The company reported increased orders. Mauna Mining Corp. mined sericite schist near Gardner for processing at the company mill at Carlisle in Cumberland County. The company went out of business in November 1964, reportedly for economic reasons.

TABLE 13.—Value of mineral production in Pennsylvania by counties [1]

County	1963	1964	Minerals produced in 1964 in order of value [2]
Adams	W	W	Stone, sericite schist, clays.
Allegheny	$35,348,049	[3] $27,192,462	Coal, cement, clays, sand and gravel, stone, iron ore (pigment material).
Armstrong	W	21,465,940	Coal, clays, sand and gravel, stone, lime.
Beaver	3,535,030	3,784,588	Coal, sand and gravel, clays.
Bedford	W	W	Stone, coal, lime.
Berks	32,397,801	W	Iron ore, cement, stone, clays, cobalt, coal, pyrites, sand and gravel.
Blair	1,903,668	1,924,474	Stone, coal, clays, sand and gravel.
Bradford	W	341,185	Sand and gravel, coal.
Bucks	W	W	Sand and gravel, stone, clays.
Butler	14,486,841	[4] 9,445,729	Coal, cement, stone, lime, sand and gravel, clays.
Cambria	37,754,195	48,488,015	Coal, clays, stone, sand and gravel, iron ore (pigment material).
Cameron	264,698	W	Coal.
Carbon	6,774,955	5,906,595	Coal, stone, sand and gravel.
Centre	W	W	Lime, stone, coal, clays.
Chester [5]	4,012,246	5,194,718	Stone, lime, clays.
Clarion	13,844,560	12,329,169	Coal, stone, clays, sand and gravel.
Clearfield	28,418,087	W	Coal, clays, sand and gravel.
Clinton	1,871,537	W	Coal, clays, stone, sand and gravel.
Columbia	3,269,045	W	Coal, sand and gravel, clays, peat.
Crawford	132,924	108,000	Sand and gravel.
Cumberland	W	W	Stone, sand and gravel, clays.
Dauphin	3,559,293	W	Stone, coal, clays, sand and gravel, lime.
Delaware	W	W	Stone.
Elk	W	W	Coal, sand and gravel, stone.
Erie	W	W	Sand and gravel, peat.
Fayette	W	12,824,818	Coal, stone, clays, sand and gravel.
Forest	W	W	Sand and gravel.
Franklin	W	1,534,184	Stone, sand and gravel.
Fulton	W	W	Stone, sand and gravel.
Greene	59,373,257	71,621,786	Coal, clays.
Huntingdon	W	W	Sand and gravel, stone, coal, clays.
Indiana	W	W	Coal, clays.
Jefferson	W	W	Coal, clays, stone, sand and gravel.
Juniata	W	W	Stone, lime.
Lackawanna	10,272,932	W	Coal, sand and gravel, stone, peat.
Lancaster	W	6,856,245	Stone, coal, sand and gravel, clays, lime.
Lawrence [3]	8,048,756	7,792,359	Cement, stone, coal, clays, sand and gravel, peat.
Lebanon	W	W	Iron ore, stone, lime, copper, cobalt, coal, pyrites, gold, silver.
Lehigh [6]	27,680,588	26,997,146	Zinc, stone, cement.

See footnotes at end of table.

TABLE 13.—Value of mineral production in Pennsylvania by counties—Continued

County	1963	1964	Minerals produced in 1964 in order of value [2]
Luzerne	W	$58,439,697	Coal, sand and gravel, stone, peat, clays.
Lycoming	$1,519,666	W	Stone, sand and gravel, coal, tripoli.
McKean	W	W	Clays, coal, stone, sand and gravel.
Mercer	W	W	Coal, sand and gravel, stone.
Mifflin	1,979,023	W	Sand and gravel, stone, lime.
Monroe	562,571	535,407	Stone, sand and gravel, clays.
Montgomery	13,097,487	[4] 7,787,028	Stone, cement, lime, clays, sand and gravel.
Montour	W	W	Stone, sand and gravel.
Northampton	66,800,123	62,486,684	Cement, stone, sand and gravel.
Northumberland	W	W	Coal, clays, stone, lime.
Perry	W	W	Stone.
Philadelphia	W	W	Sand and gravel.
Potter	254,751	W	Stone.
Schuylkill	W	W	Coal, stone, sand and gravel, clays.
Snyder	424,159	431,676	Sand and gravel, stone, coal, lime.
Somerset	13,333,376	15,682,072	Coal, clays, stone, sand and gravel.
Sullivan	66,717	82,377	Coal.
Susquehanna	W	745,587	Stone.
Tioga	W	1,603,429	Coal, sand and gravel, stone.
Union	W	W	Stone.
Venango	W	W	Coal, sand and gravel.
Warren	318,767	412,000	Sand and gravel.
Washington	W	W	Coal, stone.
Wayne	W	W	Stone, sand and gravel, peat, coal.
Westmoreland	W	W	Coal, sand and gravel, stone, lime.
Wyoming	W	593,267	Sand and gravel, stone.
York	17,146,330	[4] 7,421,637	Cement, stoue, lime, clays, sand and gravel, mica.
Undistributed [7]	[r] 448,960,011	482,021,681	
Total	[r] 857,411,000	902,050,000	

[r] Revised.
W Withheld to avoid disclosing individual company confidential data.
[1] Pike County is not listed because no production was reported.
[2] Excludes value of natural gas, natural gasoline, LP gases, petroleum, and gem stones unspecified by counties; included with "Undistributed."
[3] Excludes cement; included with "Undistributed."
[4] Excludes cement and lime; included with "Undistributed."
[5] Excludes lime; included with "Undistributed."
[6] Excludes masonry cement; included with "Undistributed."
[7] Includes values indicated by symbol W.

Alwine Brick Co. mined shale at New Oxford for building brick manufacture. The company installed new grinding equipment in 1964. Gettysburg Drain Tile Works did not operate.

Allegheny.—Bituminous coal production, most of which (81 percent) was from underground mines was greater than that of 1963. The county ranked sixth among the coal-producing areas in the State. All told, 36 mines were in operation, 17 of which were underground, 17 strip, and 2 auger. Underground production was mostly from the Double Freeport coal group. Almost all the underground production was loaded mechanically. Sixteen continuous mining machines were in use. Harman Coal Co. and Republic Steel Corp. both with two active mines were the leading underground producers. Wm. Aloe Coal Co., Pittsburgh Coal Co., and Mac Coal Co. (two mines) were the leading strip-mining companies. The latter two companies also operated the only auger mines in the county. Strip and auger mining were mostly in the Pittsburgh seam. Most of the output was mechanically cleaned at five preparation plants. The Russell No. 2 strip mine of Aloe Coal Co. received a Certificate of Achievement in Safety for working throughout 1964 without a disabling work injury.

Portland and masonry cements were produced by Universal Atlas Cement Division, United States Steel Corp. at Universal and by

Green Bag Cement Co., Division of Marquette Cement Manufacturing Co. at Neville Island, Pittsburgh. County portland cement output was almost evenly divided between air-entrained and non-air-entrained. Significant quantities of locally available slag were used to produce portland slag. Portland and masonry cement shipments were mainly by truck in bulk to consumers chiefly in Western Pennsylvania. Primary customers were ready-mixed concrete companies. Two 360-foot kilns and one 500-foot kiln were in operation.

Sand and gravel production was less than one-half of that in 1963. The Harry Zubik Company suction dredge sunk in a flood in March 1964. Completion of a highway project in the area also contributed to the drop in sand and gravel production. McGrady, Inc., was the leading producer.

Clay output was entirely for manufacturing building brick. Milliken Brick Co., Inc., the leading producer, mined shale near Wilkinsburg and Pitcairn. Boston Brick Company, Inc., was taken over by Glenn Lumber and Supply Co., Inc., North Bessemer.

A small quantity of dimension sandstone was quarried near Elizabeth and in Jefferson Boro. Pennsalt Chemicals Corp. recovered crude red iron oxide pigments from the red mud residue of a former aluminum reduction plant at Natrona. Perlite Manufacturing Co. (Carnegie) and the Panacalite Perlite Co. (Pittsburgh) produced expanded perlite from crude Colorado perlite, mainly for use in lightweight plaster and concrete. Clover Chemical Co. produced organic and inorganic iodine compounds from out-of-State crude iodine at a plant near Pittsburgh.

Armstrong.—Bituminous coal production increased mostly because of increased underground mining. The county remained seventh ranked in coal production in the State. Auger mining was significantly reduced; only 7 auger mines were active, compared with 13 in 1963. Of total output, 63 percent was from 43 underground mines, 34 percent was from 47 strip mines, and the balance was from 7 auger mines. Most of the underground output was mechanically loaded; four additional continuous mining machines were in use. Leading underground mining companies were Leechburg Mining Co., Canterbury Coal Co., and Allegheny River Mining Co. (both strip and underground). Strip producers were P. & L. Coal Co., West Freedom Mining Co. (two mines), and Snyder Coal Co. (auger and strip). Carpentertown Coal and Coke Co. was one of the larger auger-mining companies. Eight coal preparation plants cleaned about half of total output.

Production of sand and gravel was only about one-third of that produced in 1963. Output was mostly for building and paving aggregate. Universal Sand and Loam Co., Leechburg permanently closed its operation in 1964. Davison Sand & Gravel Co., the leading producer in 1963, moved its floating dredge on the Allegheny River to Westmoreland County.

Clay output, mostly fire clay for manufacturing firebrick and block, was greater than that of 1963. Eight clay mines were in operation in 1964. Freeport Brick Co. reported greatly increased output from its mine near Freeport. Howe Sound Co., Kittanning, and Kittanning Brick Co., Adrian, also produced fire clay. The latter company

installed a new mechanical loading machine in its underground mine.

Crushed limestone production was more than double that of 1963. Manor Minerals, Inc., a new producer, quarried and crushed limestone near Kittanning for concrete aggregate and roadstone. Four other limestone quarries were active; two were operated by Mowrey & Good near McWilliams and Girty. In addition to road building aggregate, crushed limestone for agricultural use (agstone) also was produced. C. D. McCanna produced hydrated agricultural lime at a plant near Kittanning.

Beaver.—Increased production of strip-mined coal offset sharply decreased output by auger mines and lower underground production. Most of the county coal output was from 12 strip mines producing mostly from the Lower and Middle Kittanning seams. Dodd's Coal Co. with two strip mines was the leading producer. The Ambrose strip mine of the Ambrosia Coal and Construction Co. received a Certificate of Achievement in Safety for working throughout 1964 without a disabling work injury.

Increased output of sand and gravel was reported to meet the demand of increased building activity. More than two-thirds of total output was building sand and gravel, most of the balance was consumed as paving aggregate. Iron City Sand and Gravel, the leading producer, operated a dredge on the Ohio River. Shippingport Sand & Gravel Co. also produced large tonnages at stationary plants near Georgetown and Shippingport.

Clay production was virtually the same as that of 1963. Four clay pits and three underground mines were in operation, producing mostly fire clay for building brick manufacture. Leading producers were Standard Clay Manufacturing Co. and Colonial Clay Products Co. operators of underground clay mines at New Brighton and Fallston, respectively. Another large producer was Darlington Brick Division, General Dynamics Corp., operators of an open-pit mine near Darlington, with output used for roofing granules.

Bedford.—Detwilers Industries, Inc., produced crushed sandstone for concrete aggregate and roadstone near New Enterprise. Leap Ganister Rock Co. did not quarry in 1964, but shipped sandstone for ganister from stockpile. New Enterprise Stone and Lime Co. produced crushed limestone chiefly for roadstone and coal mine rock dust at its Ashcom quarry near Everett. The company also produced a small quantity of hydrated lime.

Production of bituminous coal decreased 10 percent from that of 1963 because of reduced output from strip mines. Underground coal production increased slightly. The leading strip-mining companies were PBS Coals, Inc., and L. & B. Coal Co. The leading underground producer was G. M. & W. Coal Co. Feight Brothers produced a small quantity of building sand near Everett.

Berks.—Bethlehem Cornwall Corp. mined crude magnetite at its Grace mine near Morgantown. A concentrating plant at the mine recovered the iron ore by crushing, grinding, magnetic separation, and pelletizing of the fine-sized material. Pyrites (containing cobalt and copper) was recovered by flotation. The pyrite from this mine and the company's Cornwall mine in Lebanon County was shipped to a new sulfuric acid plant at Sparrows Point, Md. After roasting, the pyrite

cinder was leached to recover a concentrate containing cobalt and copper. This concentrate was shipped to Pyrites Co., Inc., at Wilmington, Del., for refining. Copper and cobalt metal and cobalt compounds were produced. This was the only cobalt metal production from a domestic primary source.

Allentown Portland Cement Co. produced portland and masonry cements at a plant near Evansville. Most of the output was non-air-entrained, general-use cement for sale mainly to ready-mixed concrete companies. Shipments were mostly by truck and railroad in bulk. Primary consuming States for the portland and masonry cement produced by the company were Eastern Pennsylvania, New Jersey, New York, and Connecticut. The company mined the cement rock and limestone needed for raw material. The cement mill had five kilns in operation, of which four were 160 feet, and one was 127 feet in length.

Crushed limestone produced by four companies remained virtually the same rate as in 1963. Allentown Portland Cement Co. operated quarries near Evansville and Oley; Eastern Lime Corp. quarried near Oley and Kutztown, producing limestone mostly for use in cement manufacture. The latter company also produced roadstone. E. J. Breneman, Inc., Sinking Spring, and Berks Products Corp., Temple, produced crushed limestone mainly for aggregate. Crushed oystershell was produced by Reading Poultry Food Co. for use as poultry grit and mineral food. The Oley No. 1 and No. 2 and Evans quarries received a Certificate of Achievement in Safety for operating through 1964 without a disabling work injury.

Three companies produced crushed basalt for sale mainly to the roadstone and railroad ballast markets. Producers were the John T. Dyer Quarry Co., Birdsboro; Bradford Hills Quarry, Inc., Morgantown; and Pottstown Trap Rock Quarries, Inc., Douglassville. Martin Quarries produced sandstone (crushed) for concrete aggregate and stone sand at a quarry near Bechtelsville.

Anthracite coal was mined at a higher rate than that of 1963.

Sand and gravel production decreased sharply. Refractory Sand Co., Inc., the leading producer in 1963, closed its plant in March 1964 because of reported unfavorable economic conditions. Schildt Brothers also closed its pit in 1964. Grings Quarry produced building and paving aggregate at a stationary plant near Sinking Springs. Glen-Gery Shale Brick Corp. mined shale at open-cut mines near Wyomissing and Shoemakersville for manufacturing building brick.

Blair.—Eight companies operated nine limestone quarries producing mostly concrete aggregate and roadstone. New Enterprise Stone & Lime Co. quarried and crushed limestone at its Roaring Springs and Canoe Creek stationary plants. Narehood Brothers, Inc., produced crushed limestone for concrete aggregate and agstone near Tyrone. Roadstone and asphalt filler were the markets of the crushed limestone produced by Grannas Brothers Stone & Asphalt Co., Inc., at Hollidaysburg. General Refractories Co. and J. L. Hartman produced crushed quartzite for ganister at Hollidaysburg and Sproul. C. E. Powell produced crushed quartzite, mostly for aggregate at Williamsburg.

Firebrick and fireblock was produced by Harbison-Walker Refrac-

tories Co. at Williamsburg from both purchased and mined clay. Four other clay mines in the county were idle in 1964. Four underground coal mines and one strip mine produced at a slightly lower rate than that of 1963. Frankstown Sand Supply produced building sand at a stationary plant near Hollidaysburg. West Virginia Pulp & Paper Co. regenerated lime at its pulp-and-paper plant for reuse in its manufacturing process.

Bradford.—Sand and gravel output almost doubled that of 1963. State Aggregates, Inc., assumed operation of J. A. Eck & Sons, Inc., in April. Towanda Sand & Gravel Co., Inc., reported increased production of building and paving sand and gravel at a stationary plant near Towanda.

Reduced bituminous coal production was reported by Paul Percival from his Sands Run strip mine.

Bucks.—Crushed limestone, entirely for paving aggregate and roadstone use, was quarried at four locations. Reduced prices for county output indicated increased competition. Leading producers were Eureka Stone Quarry, Inc., and New Hope Crushed Stone & Lime Co. with quarries at Eureka and New Hope, respectively. Crushed basalt was quarried at five locations at a rate more than one-fifth greater than that of 1963. Output was entirely for concrete aggregate and roadstone. Leading producers were General Crushed Stone Co., Quakertown; and Tohickon Quarry Co., Weisel. A small quantity of dimension basalt was quarried for rough construction uses. Dressed building dimension sandstone and flagging was quarried by Delaware Quarries at Lumberville. The company reported purchase of new trucks, improving its transportation facilities. George Wiley produced crushed sandstone (bluestone) near Point Pleasant for construction aggregate. Miscellaneous stone (argillite) was quarried and crushed by Better Materials Corp., Penns Park, and Gill Quarries, Inc., Trevose, for sale as roadstone. Better Materials Corp. installed new crushing equipment. Vernon Horn produced crushed granite near Chalfont for concrete aggregate and roadstone.

The county continued as the first ranked area in sand and gravel production in the State. Output was marketed almost equally for building and paving. Most of the production originated in Tullytown and Upper Black Eddy. The leading producer, by far, was the Warner Co. at the largest plant in the State, the Van Sciver plant near Tullytown. Other large producers were Penn Valley Crushed Stone Co., Levittown; and Durnan & Good, Upper Black Eddy.

Quakertown Brick & Tile Co., Inc., mined shale near Quakertown for manufacturing building brick. Hyzer and Lewellen produced exfoliated vermiculite near Southampton for use mainly in home insulation and as a lightweight aggregate.

Butler.—Bituminous coal production decreased because of reduced production from the 33 strip mines in the county, output from which comprised 82 percent of the total in 1964. Fourteen underground and 14 auger mines were in operation. Of total underground production about four-fifths was loaded mechanically. Equipment in use at the strip mine included 46 power shovels and 27 draglines. Seven of the draglines and two of the power shovels had dipper capacities ranging from 6 to 12 cubic yards. Most of the strip pro-

duction was in the Brookville and Middle Kittanning Coal seams. Sunbeam Coal Co. & Kerry Coal Co. (three mines) were the leading strip-mining companies; both also operated auger mines. Eagal Coal Co. was the leading underground mining company. Three cleaning plants prepared about one-fourth of total county output.

Portland and masonry cements were manufactured by Penn-Dixie Cement Corp. at a plant near West Winfield. Most of the output was typed for general use and moderate heat, with large quantities of both air-entrained and non-air-entrained. Ready-mixed concrete companies were the major consumers. The majority of shipments was in bulk by truck to consumers in the Western Pennsylvania area. The company produced the limestone and sand portions of its raw material requirements. Two 250-foot kilns, 10.5 feet in diameter, were in use.

Limestone production in the county in excess of 1 million tons was quarried by five companies. Road building and cement manufacture were the principal markets. Some agstone, riprap, and flux was sold. The three larger quarries were operated by Allegheny Mineral Corp., Harrisville; Penn-Dixie Cement Co., West Winfield; and Sechan Limestone Co., Portersville. Secondary crushing facilities were improved by Winfield Lime & Stone Co., Inc. Annandale Sandstone Co. produced sandstone riprap and architectural dimension stone near Boyers. The West Winfield mine of Penn-Dixie Cement Corp. received a Certificate of Achievement in Safety in the nonmetal group for working throughout 1964 without a disabling work injury.

Sand and gravel mainly for building and paving aggregate was produced at three stationary plants. H. W. Cooper and Highway Sand & Gravel Co., Inc., both operated plants near Slippery Rock. Mercer Lime & Stone Co. produced mainly quicklime near Branchton, mostly for consumption in steel furnaces. A significant tonnage also was sold for water purification. Shale was mined at an open cut near Mars by Scott Borland Brick Yard for building brick manufacture.

Cambria.—The county ranked third in bituminous coal production, having an output of 8.7 million tons, 1.8 million tons more than that of 1963. Of total output, 87 percent was mined at 87 underground operations; 12 percent at 20 strip mines; the balance at 6 auger mines. At the underground mines, 92 continuous miners were in use, 6 more than in 1963. The county tied with Greene County in number of active continuous mining machines. Most of the underground output was mechanically loaded. Of total output, more than three-fourths was cleaned at 11 preparation plants. Most of the county production was from the Upper and Lower Kittanning and Freeport coal seams. Leading underground coal producers were Bethlehem Mines Corp. (five mines), Barnes & Tucker (three mines), and Eastern Associated Coal Co. Major strip mining companies were North Cambria Fuel Co., C. E. Powell Coal Co., and Ace Drilling Co. (also a leading auger-mining company).

Triangle Clay Products Co. mined miscellaneous clay at an open cut near Johnstown for building brick. North Cambria Fuel Co. recovered fire clay from coal strip pits, and George P. Gates operated an underground mine at Patton to produce fire clay for sale to Patton Clay Manufacturing Co. chiefly for manufacturing vitrified sewer

pipe. Triangle Clay Products Co. purchased new equipment and paved its stocking areas. Crushed sandstone for construction aggregate was produced by the Appalachian Stone Division, Martin Marietta Corp. and sand and gravel was produced by Parry Sand & Gravel Co. for construction uses; both operations were near Johnstown.

Lanzendorfer Minerals Co. produced sulfur mud for yellow iron oxide pigments at an operation near Nanty Glo.

Cameron.—Rydesky Mines, the only bituminous coal mining company in the county in 1964, operated a strip mine in the Lower Kittanning seam.

Carbon.—Anthracite coal production decreased from 645,000 tons in 1963 to 501,000 tons in 1964. The leading producers were Lehigh Valley Anthracite, Inc., and Greenwood Stripping Corp.

North American Refractories Co. produced captive crushed quartzite near Palmerton for ganister. Fauzio Bros. produced crushed sandstone near Nesquehoning for aggregate and for sale to cement companies. Alliance Sand Co., subsidiary of Martin Marietta Corp., produced building and paving sand and sand for sale to cement manufacturers at a stationary plant near Palmerton. Building sand and gravel was produced near Hazleton. The Prince Manufacturing Co. finished mostly natural red iron oxides and pyrite cinder near Bowmanstown for use as iron oxide pigments.

Centre.—The county continued as the leading lime producing area. High calcium lime was produced mostly for chemical and industrial uses, chief among which was use in steel furnaces. Other large chemical and industrial uses were for pulp and paper, water purification, tanning, and chromium chemical manufacture. Producers were Warner Co. and National Gypsum Co., both of Bellefonte and Standard Lime & Cement Co., Division Martin Marietta Corp., Pleasant Gap. A large portion of the lime output was consumed within the State.

Crushed limestone for captive use in lime manufacture was the leading use in 1964. However, significant quantities also were produced for concrete aggregate and roadstone. Other uses included glass manufacture, rock dust for coal mines, flux, and stone sand. Total output was almost 2.5 million tons. Leading producers were Warner Co. and National Gypsum Co., both at Bellefonte; and Appalachian Stone Division, and Standard Lime & Cement Co., both divisions of Martin Marietta Corp. at Pleasant Gap. For the fourth consecutive year the Bellefonte mine of National Gypsum Co. won the famed Sentinel of Safety trophy granted to that company among all the quarrying companies having the lowest lost-time injury rate (based on the most man-hours).

The Pleasant Gap Mine of Standard Lime & Cement Co. received a Certificate of Achievement in Safety for working throughout 1964 without a disabling work injury. The Warner Co. and National Gypsum Co. both performed exploration and development work and improved mining systems at their underground mines.

Coal production dropped 21 percent because of significantly reduced strip-mined tonnage, which comprised 91 percent of total output. Leading producers were Elliott Coal Mining Co. and Wasson, Inc., at strip mines; Holden, Finberg and Finberg, at underground mines;

and R. S. Carlin, Inc., at auger mines. The Carlin No. 6 strip mine of R. S. Carlin, Inc., received a Certificate of Achievement in Safety for operating throughout 1964 without a disabling work injury. Plastic fire clay for manufacturing firebrick and block was mined by Harbison-Walker Refractories Co. at its Blair opencut mine near Stormstown. A new fire-clay pit was put into production by Reese Brothers Coal Co. near Osceola Mills. Output was sold for firebrick and block.

Chester.—Crushed limestone production was slightly more than that of 1963, but total value increased significantly as sharply increased prices in certain stone markets were reported. Most of the output was for concrete aggregate and roadstone. Other uses included blast- and open-hearth furnace flux, lime manufacture, and magnesium metal manufacture. Limestone producers were Bradford Hills Quarry, Inc., Downington; Warner Co., Paoli and Devault; and Appalachian Stone Division, Martin Marietta Corp., Malvern. Warner Co. reported installation of new screening equipment. Basalt was quarried and crushed for roadstone by V. Di Francesco & Sons, Devault; and Keystone Trappe Rock Co., Cornog. The latter company also produced railroad ballast. French Creek Granite Co. quarried dimension basalt near St. Peters, mostly rough blocks for architectural use. Dimension sandstone (bluestone) mostly for rough construction and rubble was quarried, mostly in the Avondale vicinity. Valley Forge Building Stone Co. (formerly Frank Rarick) was the leading producer.

The Warner Co. produced high-magnesium lime at its Cedar Hollow Plant near Devault for mason's lime, sewage treatment, and agricultural uses. Clay and shale was mined by McAvoy Vitrified Brick Co. at an opencut mine near Phoenixville for building brick manufacture.

Clarion.—Coal production was 14 percent less than that of 1963, but the county retained its second ranking in strip mining among the coal-producing counties. Most of the production loss was attributed to a 500,000 ton reduction in strip output, which comprised 96 percent of output. Twenty-seven strip mines, five less than in 1963, were in operation, mostly in the Clarion and Lower Kittanning seams. Two continuous mining machines loaded most of the underground production, and 61 power shovels and 38 draglines were in use at the strip mines. Of the draglines in use, 18 had dipper capacities of 6 to 12 cubic yards, and 3 had capacities greater than 12 cubic yards. Leading strip and auger producers were C. & K. Coal Co., Allison Engineering Co., and Mac Coal Co. The largest underground mine was operated by D. & J. Coal Co. Six cleaning plants prepared 82 percent of total output.

Plastic and flint fireclay was mined underground by Climax Division, A. P. Green Fire Brick Co. for its own use in producing firebrick and block. New Bethlehem Tile Co. mined both fire clay and miscellaneous clay for building brick at an opencut mine near New Bethlehem. Kaiser Refractories and Chemicals Division, Kaiser Aluminum and Chemical Corp. was idle in 1964.

Allegheny Mineral Corp. (Parker) and Emlenton Limestone Co. (Turkey City) produced crushed limestone mostly for aggregate.

Increased sand and gravel output was reported by the Glacial Sand & Gravel Co. from a stationary plant near Parker. Fill and antiskid material also was produced.

Clearfield.—The county ranked fourth in total coal production and first in both strip and auger mining. There were 169 mines in operation of which 92 were strip, 60 were underground, and 17 were auger. Six fewer underground mines were active, and underground tonnage dropped 12 percent. Auger-mining activity sharply increased with nine new operations contributing to output more than 2½ times greater than that of 1963. Strip production of 6.1 million tons comprised 84 percent of total output. At the strip mines, 176 power shovels and 96 draglines removed overburden or loaded coal, almost three times more equipment than in the next ranking county. Most of the output was from the Kittanning and Freeport seams. Twenty of the strip mines produced more than 100,000 tons. Benjamin Coal Co. was the leading strip and auger mining company. The leading underground mine was operated by Lady Jane Collieries, Inc. Twelve cleaning plants prepared 40 percent of total output. The Last Run No. 1 mine of the Diamond T. Strip Mining Corp. received a Certificate of Achievement in Safety for operating throughout 1964 without a disabling work injury.

The county dropped to second place in clay production with output of 435,000 tons of clays. There were 21 mines in operation producing mostly fire clay for firebrick and fireblock and other refractory products. Harbison-Walker Refractories Co. consumed both purchased fire clay and fire clay of its own production to produce firebrick and fireblock. Augenbaugh Coal Co., Inc., Curwensville, and Bartell Excavating, Inc., Boardman, sold large quantities of fire clay to refractory product manufacturers. Falls Creek Refractories Co. and Blair Clay Products, Inc., both of Curwensville, produced and consumed significant quantities of fire clay.

Applachian Stone Division, Martin Marietta Corp. operated a stationary sand and gravel plant near Curwensville, output being used for building and paving aggregate.

Clinton.—Bituminous coal production was virtually the same as that of 1963. Almost all the output was from seven strip mines, three more than in 1963. Only two small hand-loading underground mines were active. The leading strip producer was D. G. Wertz Coal Co. Strip output was mostly from the Lower and Middle Kittanning seams. The Garden Coal Co. received a Certificate of Achievement in Safety for operating its strip-coal mine throughout 1964 without a disabling work injury.

Lycoming Silica Sand Co. produced crushed limestone at Salona for road construction. Mill Hall Clay Products, Inc., produced heavy clay products from shale mined by Lee Bowman, contractor. Flint fire clay mined at two small pits, was sold mainly to high-alumina brick manufacturers.

Columbia.—Anthracite coal production was more than twice that produced in 1963. The leading producer was Jeddo-Highland Coal Co.

Building brick was manufactured by The Alliance Clay Product Co. from shale mined near Mifflinville. Building and paving sand pro-

duced by Bloomsburg Sand & Gravel Co., Inc., was processed at a stationary plant near Bloomsburg. Benton Peat, Inc., produced moss and humus peat from a bog near Benton for sale mostly for general soil improvement.

Crawford.—Sand and gravel production, mostly for paving aggregate was produced at a reduced rate from three stationary plants. Producers were Hasbrouck Sand & Gravel Co., Titusville; W. L. Dunn, Cochranton; and Conneaut Lake Sand & Gravel, Inc., Conneaut Lake.

Cumberland.—Slackened construction activity in 1964 was reflected by a significant drop in crushed limestone production, particularly in the area near Shippensburg. Five quarries were in operation producing mostly concrete aggregate and roadstone. Hempt Bros., Inc., Camp Hill, the leading producer also was the leading producer of sand and gravel. Both commodities were for the paving aggregate market. C. & L. Goodhart produced masonry sand near Walnut Bottom. Philadelphia Clay Co. mined kaolin near Mt. Holly Springs for sale to manufacturers of white cement.

Dauphin.—Crushed limestone was produced mainly for aggregate and for blast-and-open-hearth furnace flux. Hempt Bros., Inc., took over operation of the Bethlehem Steel Co. Steelton plant. Other producers were H. E. Millard Lime & Stone Co., Palmyra, and George E. Ebersole & Sons, Hummelstown. Faylor Lime & Stone Co. quarried and crushed increased tonnages of basalt for concrete aggregate and roadstone. Gangloff Bros. was the leading anthracite producer in the county.

Anthracite was produced at virtually the same rate as in 1963. H. E. Millard Lime & Stone Co. produced high-magnesium lime at its Swatara plant near Annville, mostly for agricultural use. Output of sand and gravel by Pennsy Supply, Inc., at its Amity Hill plant, was almost three times that of 1963. New roadbuilding activity in the area was the principal reason for the large increase in production. Glen-Gery Shale Brick Corp. mined captive shale at opencuts near Middletown and Harrisburg for building brick manufacture.

Delaware.—Media Quarry Co. quarried dimension sandstone near Media for rough construction and architectural uses and for rubble. V. Di Francesco & Sons quarried and crushed basalt at the Llanerch and Freeboro quarries for sale mostly to roadbuilding contractors. General Crushed Stone Co. quarried basalt mostly for the aggregate market at the Glen Mills quarry. The county was the leading basalt-producing area in the State. Mica schist for a rough building stone was quarried by Carl Galantino, Inc., Marple; F. Cantano & Sons, Broomall; and Di Bonaventura Quarries Inc., Springfield. Dimension granite was quarried by Joseph F. Faccenda and The Lima Building Stone Quarry, Inc., near Swarthmore and Lima, respectively. The Llanerch quarry of V. Di Francesco & Sons Co. received a Certificate of Achievement in Safety for working throughout 1964 without a disabling work injury.

Perlite Products Co. processed crude Colorado perlite at a plant near Primos and produced expanded perlite for sale chiefly as lightweight plaster aggregate. Sinclair Refining Co. and Sun Oil Co.

recovered sulfur in the liquid purification of oil refinery gas at Marcus Hook.

Elk.—Bituminous coal production was more than 200,000 tons less than that of 1963. The loss was attributed to sharply reduced strip- and auger-mined tonnage. The leading underground-mining company was the Blue Valley Coal Co. The larger strip-mining companies were P. & N. Coal Co., Inc.; Smith & Rogus Coal Co.; and Blusea Coal Co. Output was mostly from the Lower Kittanning and Lower Freeport seams.

Clark Construction Co. produced crushed sandstone near Johnsonburg for construction aggregate. Paving gravel was produced by Stone Haven Mix from a portable plant near Johnsonburg. Artificial graphite was produced by Speer Carbon Co., Division of Air Reduction Co., Inc., at a plant near St. Mary's for shipment to Niagara Falls, N.Y., for further processing. The processed material was sold to steel and chemical companies for use as graphite electrodes and anodes.

Erie.—The county advanced from third to second rank among State sand and gravel producing counties. Erie Sand Steamship Co. was the leading producer with output of more than 1 million tons. The company operated a dredge on Lake Erie and produced mostly building sand. Nickel Plate Sand & Gravel Co. produced a wide variety of specialized sand and gravel products and also bank-run fill gravel. All told, seven companies were active in 1964.

Donald L. Wenner did not operate his sandstone quarry in 1964. Corry Peat Products Co. produced mostly reed-sedge peat for general soil improvement.

Fayette.—Bituminous coal production increased 22 percent from that of 1963. Of total output, 71 percent was from 24 underground mines; the balance was from 26 strip mines. There was no auger production in 1964. In use at the underground mines were 14 continuous mining machines (3 more than 1963). Ninety-four percent of the underground production was loaded mechanically. Four cleaning plants were in operation. Underground output was mostly from the Pittsburgh and Lower Kittanning seams, and strip production was from the Pittsburgh Redstone and Sewickley seams. Leading underground mining companies were National Mines Corp. and Eastern Associated Coal Co. Leading strip mine operators were Bridgeview Coal Co. and Purco Coal Co.

Connellsville Blue Stone Co. produced crushed sandstone (bluestone) near Connellsville for sale as construction aggregate. General Refractories Co. produced ganister from quartzite quarried near Layton. A small quantity of sandstone rubble also was produced. Appalachia Stone Division, Martin Marietta Corp. produced crushed limestone at quarries near Uniontown and Lake Lynn. Output was significantly less than that of 1963.

Harbison-Walker Refractories Co. and Kaiser Refractories and Chemicals Division, Kaiser Aluminum & Chemical Corp., mined fire clay at the Smith and Ohiopyle opencut mines near Ohiopyle for firebrick and fireblock manufacture. Layton Fire Clay Co. mined miscellaneous clay for building brick and purchased fire clay from Robert N. Matthews for firebrick and fireblock manufacture.

McClain Sand Co., Inc., continued operating a dredge on the Monongahela River near Point Marion and produced sand and gravel for building and paving aggregate.

Forest.—Tionesta Sand & Gravel, Inc., produced building and paving sand and gravel from a stationary plant near Tionesta at virtually the same rate as that of 1963.

Franklin.—Crushed limestone production by three companies at five quarries was less than that of 1963, because of reduced consumption of roadbuilding aggregate. Valley Quarries, Inc., quarried limestone at two locations, Chambersburg and at Shippensburg; the latter site was formerly owned by Pinola Lime & Stone Corp. Other producers were Appalachia Stone Division, Martin Marietta Corp. with quarries near Zullinger and Williamson, and New Enterprise Lime & Stone Co., at Dry Run.

Building sand was produced at stationary plants near Fayettesville by Mt. Cydonia Sand Co., Inc., and Caledonia Sand Co. Output was virtually at the same rate as that of 1963.

Fulton.—H. B. Mellot Estate, Inc., installed additional equipment and sharply increased production of crushed limestone mainly for aggregate at its Morton and Charlton quarries and also produced building and paving sand near Warfordsburg.

Greene.—The county with 11.6 million tons of output ranked second among the 29 bituminous coal producing counties in the State. Virtually the entire output was from 26 underground mines operating in the Pittsburgh coal seam. Output was almost 2 million tons greater than that of 1963. Nine strip mines also were active. Underground production which increased 20 percent was to a great extent loaded by 92 continuous mining machines. United States Steel Corp. had 48 continuous miners in operation. Most of the total coal output was mechanically cleaned, a significant portion in Fayette County. Leading producers (all underground mines) were United States Steel Corp. (four mines), Gateway Coal Co., Jones & Laughlin Steel Corp., Duquesne Light Co., and the Buckeye Coal Co.

Clay and shale were mined by Greene County Clay Products Co., Inc., at an opencut mine near Waynesburg for its own use in manufacturing building brick.

Huntingdon.—Pennsylvania Glass Sand Corp. produced a wide range of industrial and ground sands at its Keystone Works near Mapleton Depot. Glass sand was the leading market. The high value of the company product ranked the county second in value of production, even though it ranked fifth in tonnage output.

Crushed limestone was produced at virtually the same rate as that of 1963. Warner Co. quarried and crushed limestone at its Union Furnace facility near Tyrone, and New Enterprise Stone & Lime Co. did the same at its McConnellstown operation. Output was mostly for concrete aggregate and roadstone. North American Refractories Co. produced mostly refractory stone from quartzite quarried near Three Springs. Alexandria Fire Clay Co. mined plastic fire clay near Alexandria for sale to refractory mortar producers. A small quantity of bituminous coal was mined at two strip mines and five small underground mines operating mostly in the Kelly and Fulton seams.

Indiana.—Production of bituminous coal decreased slightly but the

county remained fifth ranking in output. Of the 5.5 million tons produced, 86 percent was mined at 71 underground operations; the balance at 26 strip and 2 auger mines. Seven more continuous miners were in operation making a total of 47. Of underground production, 95 percent was loaded mechanically, and of total production, 72 percent was mechanically cleaned at 12 cleaning plants—3 more than in 1963. Most of the coal production was from the three Kittanning and two Freeport seams. Leading underground mining companies were Rochester & Pittsburgh Coal Co. (two mines) and Crichton Coal & Coke Co. The larger strip mining companies were Taylor Bros. and Mears Coal Co. (two mines)

Plastic fire clay was mined by Hiram Swank's Sons, Inc., and by L. H. Foehrenbach, near Clymer (sold to Hiram Swank's) for use in manufacturing a variety of clay refractory products.

Jefferson.—Bituminous coal production increased slightly from that of 1963. Of the 1.9 million tons produced, 58 percent was mined at 25 strip mines; 37 percent, at 25 underground mines; the balance, at 8 auger mines. Strip-coal production decreased, but both underground and auger production increased. The county ranked third in auger mining. Of underground production, 96 percent was mined mechanically. Five continuous miners were in use; one less than in 1963. Equipment used at strip mines included 48 power shovels and 17 draglines; four had bucket capacities between 6 and 12 cubic yards. Leading underground producers were Doverspike Bros. Coal Co. and United Industries, Inc.; strip producers were R. D. Baughman Coal Co., Inc. (three mines). The latter company and P. & N. Coal Co. operated the largest auger mines. Coal seams mined were the Lower and Middle Kittanning and the Lower Freeport. The Cherryhill No. 1 underground mine of Imperial Coal Corp. received a Certificate of Achievement in Safety for working throughout 1964 without a disabling work injury.

Plastic fire clay was mined near Summerville by Hanley Co. for building brick manufacture. The Brockway Clay Co. produced fire clay from one underground and strip mines near Brockway for manufacturing vitrified sewer pipe. Flint fire clay was mined and sold by Henry O'Neill & Co. to firebrick and fireblock manufacturers. Sugar Hill Limestone Co. produced crushed limestone at Brockway chiefly for sale as agstone. Bank-run paving gravel was produced near Brockway.

Juniata.—Increased highway construction in the area brought about a large increase in output of crushed limestone by Juniata Limestone Co., McAlisterville. Agricultural quicklime was produced by Fulkroad Lime Quarry near McAlisterville.

Lackawanna.—Moffat Coal Co., Inc., and Carbondale Coal Co., Inc., were among the larger anthracite producers in the county. Output in 1964 was 920,000 tons, almost 40,000 tons less than that of 1963. Stabler Construction Co. produced sandstone aggregate from a quarry near Scranton. Contractors Sand & Gravel, Inc., operated an open pit and a stationary plant near Moscow, and produced building and paving sand and gravel, much of which was used in ready-mixed concrete. Two other pits were active, yielding mostly paving sand

and gravel. Packaged reed-sedge peat was sold by Lake Linda Peat Co., Inc., from crude peat mined at a bog near Dalton.

Lancaster.—The county was fifth ranked in the State in limestone production with large crushed limestone output mostly for concrete aggregate and roadstone. Significant tonnage of agstone also was produced. Seventeen quarries were active in 1964; 13 produced more than 100,000 tons. The leading producers were Ivan M. Martin, Inc., Blue Ball; D. M. Stoltzfus and Son, Inc., Talmage and Quarryville; and A. G. Kurtz & Sons, Inc., Denver. Total output was slightly less than that of 1963. Equipment installations during the year included new conveying, screening, and storage facilities by David M. Burkholder, Inc., and a new primary crusher by A. G. Kurtz & Sons, Inc.

Anthracite was dredged from the Susquehanna River. Output was at virtually the same rate as in 1963. Building or paving sand and a small quantity of fire or furnace sand was produced. Four pits were in operation; the largest was Milton Grove Sand, Inc., operators of a stationary plant near Milton Grove.

Building brick was produced by Glen-Gery Shale Brick Corp. and Lancaster Brick Co. from shale or clay mined near Ephrata and Lancaster, respectively. Narvon Mines, Ltd., operated an opencut mine near Narvon, producing plastic fire clay for sale mostly as a mineral filler. The company reported a major plant renovation in 1964. Amos K. Stoltzfus produced agricultural quicklime near Elverson.

Lawrence.—Bessemer Cement Co., Division of Diamond Alkali Co. and Medusa Portland Cement Co. produced portland and masonry cement at plants at Bessemer and Wampum, respectively. Air-entrained for general use was the principal cement type produced. Most of the shipments were made in bulk by truck chiefly to ready-mix concrete companies. The leading consumers were located in Eastern Ohio and Western Pennsylvania. Both companies quarried the shale and stone raw material. Six kilns were in operation in 1964, of which two were 390 feet in length, one was 450 feet, and three were 235 feet. Bessemer Cement Co. replaced a mill in its slurry grinding department and a finished mill in its cement grinding department. Bessemer Cement Co. and Medusa Portland Cement Co. received Certificates of Achievement in Safety for operating throughout 1964 without a disabling work injury.

The county was third ranked in limestone production, having an output of almost 3.2 million tons. United States Steel Corp. was the largest producer, reporting output of crushed stone for blast-furnace flux greatly exceeding that of 1963. In addition to the limestone produced by the cement companies, New Castle Lime & Stone Co. produced rock dust, filler, and aggregate.

The county replaced Clearfield County as the leading producer of clays. Ralph A. Veon, Inc. (Enon Valley) produced the largest amount of clay, with output of plastic fire clay for sale to building-brick and vitrified-sewer-pipe manufacturers and to foundries. The company acquired new mining equipment in 1964. Metropolitan Brick, Inc., mined plastic fire clay and shale near Bessemer for building brick. The Negley Fire Clay Co. mined plastic fire clay for refractories and building brick near New Galilee.

Bituminous coal production dropped 6 percent, compared with that

of 1963. Most of the output was from 19 strip mines, 2 less than 1963. Output mainly was from the Lower and Middle Kittanning seams. Ambrosia Coal and Construction Co. (four mines) and R. A. Veon, Inc., were leading strip-coal producers. Only one small underground and two small auger mines were in operation in 1964.

Production of sand and gravel, most of which was sold as building and paving aggregate, was less than that of 1963. Mahoning Valley Sand Co. was the leading of three producers, operating a stationary plant near West Pittsburg. General declining construction activity was reported in this area. Reed-sedge and humus peat was recovered by D. M. Boyd and Moores Humus and Nursery from bogs near New Wilmington and Washington, respectively. Output was sold entirely in bulk form for soil conditioning. Zonolite Co. produced exfoliated vermiculite at its Ellwood City plant for use chiefly as loose-fill insulation.

Lebanon.—Bethlehem Cornwall Corp. mined magnetite iron ore at Cornwall and processed the crude ore at its Cornwall concentrator. The magnetite was recovered by crushing, grinding, magnetic separation, and agglomeration. Valuable byproducts recovered by flotation were gold and silver, copper, pyrite, and cobalt. The No. 3 mine of Bethlehem Cornwall Corp. received a Certificate of Achievement in Safety in the metal group for operating throughout 1964 without a disabling work injury.

Increased production of crushed limestone was reported in the county. Most of this increase was attributed to increased sales of blast- and open-hearth furnace flux. Larger limestone consumption by cement companies, both purchased and captive, was reported. Leading limestone producers were H. E. Millard Lime & Stone Co. and Calcite Quarry Corp., both of Lebanon; and Fiala, Inc., Annville. The former company reported installation of additional limestone grinding and screening facilities. The company also produced high calcium lime near Annville mostly for sale to steel companies. Other uses were for water purification, mason's lime, and agriculture. The company did not operate its Palmyra plant in 1964. The leading anthracite mining company was Talbot Realty Co., Inc. County anthracite production was 31,000 tons, compared with 44,000 tons in 1963. Whitmoyer Laboratories, Inc., consumed crude iodine in manufacturing iodine compounds at a Myerstown plant.

Lehigh.—Sphalerite (zinc sulfide), mined and concentrated at the Friedensville mine, was shipped to a smelter at Palmerton for recovery of zinc metal.

Four cement companies were in operation in 1964, and all shipped more than 1 million barrels of portland cement. Producers were Whitehall Cement Manufacturing Co., Cementon; Giant Portland Cement Co., Egypt; Lehigh Portland Cement Co., Fogelsville; and Coplay Cement Manufacturing Co., Coplay. Shipments were largely in bulk by truck to ready-mixed concrete companies and concrete product manufacturers. The major portion of shipments was of the general use, non-air-entrained type to consumers in New Jersey, eastern Pennsylvania, New York, and Connecticut. Twenty-eight kilns were in operation. The Whitehall Cement Mfg. Co. put a new large kiln in operation and discontinued operating six smaller kilns

late in 1964. The company made large-scale improvements to its plant, replacing equipment and increasing capacity. Cement manufacturing companies produced captive limestone. Concrete aggregate and roadstone were the chief markets for the limestone produced by Eastern Lime Corp., Stiles; Lehigh Stone Co., Armrod; and Roy J. Kern, Schnecksville. New Jersey Zinc Co. processed waste limestone rock from its Friedensville mine for sales chiefly as agstone. Total limestone production was 2.5 million tons, an increase of 200,000 tons from that of 1963. Roy J. Kern increased crushing facilities and Lehigh Stone Co. installed a classifier at its washing-screening plant. The Reliance "B" quarry of Giant Portland Cement Co. and Quarry No. 8 of Coplay Cement Manufacturing Co. received a Certificate of Achievement in Safety for operating throughout the year without a disabling work injury.

Penn Big Bed Slate Co., Inc., quarried dimension slate near Slatedale mostly for structural and sanitary use, and for blackboards. The company had fire damage to its plant in 1964, but replaced the burned building and equipment and was back in operation without a great loss of operating time. Pennsylvania Perlite Corp. produced expanded perlite at its Allentown plant for use in lightweight plaster and in cryogenics.

Luzerne.—The county continued as first ranking area in anthracite production with output of 6 million tons, a significant reduction from the 6.8 millioin tons produced in 1963. Leading producers were Glen Alden Corp., Susquehanna Coal Co., Jeddo-Highland Coal Co., George Rancho, and Hudson Realty Co., Inc.

Crushed sandstone, chiefly for construction aggregate, was produced by Coolbaugh Sand & Stone, Inc., Dupont; General Crushed Stone Co., White Haven; and American Asphalt Paving Co., Shavertown. Output was less than that of 1963. Significantly increased production of sand and gravel was reported. Both sand and gravel shared in the increase. All six producers operated stationary plants, and 100 percent of output was processed. Leading producers were J. A. & W. A. Hess, Inc., Nescopeck; Airport Sand & Gravel Co., Inc., Wyoming; Frank B. Sgarlat Sand & Gravel Co., Forty Fort; and Honeyhole Sand & Stone Co., Hazleton.

The county was the leading peat-producing area in the State. Four producers mined and sold peat, mostly humus and reed-sedge in bulk, for general soil improvement. Producers were Bald Mountain Peat Corp., Wilkes-Barre; and Blue Ridge Soil Pep Co., Inc.; Pennsylvania Peat Moss, Inc.; and Stillers Blue Ridge Peat Co., all near White Haven.

Hazleton Brick Co. mined shale for building brick at an opencut mine near Hazleton. Bylite Corp. reclaimed shale from a coal refuse bank for lightweight aggregate production. Hazleton Brick Co. reported increasing its manufacturing facilities.

Lycoming.—Lycoming Silica Sand Co., operator of limestone quarries near Jersey Shore and Muncy, in 1964 purchased the Susquehanna Quarry Co. Jersey Shore Limestone quarry but did not operate the plant. Output of these quarries was chiefly for road construction. Some agstone also was sold. The company also operated a stationary sand and gravel plant near Montoursville producing building and

paving aggregate, railroad ballast, sub-base fill, and smaller quantities of engine and molding sand.

Strip-mined coal production showed a sharp increase from that of 1963. Industry in the county, however, was small; only three strip operations and one small underground mine were active. The larger strip mines were operated by Fisher Mining Co. and Paul Percival. Small quantities of sandstone rubble and flagging were quarried.

Keystone Filler & Manufacturing Co. and Penn Paint & Filler Co. mined tripoli (rottenstone) near Muncy and Antes Fort, respectively, for sale as a filler and abrasive material. The former company also produced crushed slate flour near Muncy.

McKean.—Wetmore Coal Co., the only coal producer, stripped the Lower and Middle Kittanning seams. Kane Stone Co. produced mostly aggregate material at a sandstone quarry near Kane and C. L. McGavern, Jr., produced bank-run fire or furnace sand from a pit near Eldred. Shale for building brick was produced at an opencut mine near Lewis Run by Hanley Co.

Mercer.—Bituminous coal production by 11 strip mining companies was 40 percent less than that of 1963. No underground or auger mines were in operation. The entire coal output was from the Brookville seam. One mechanical cleaning plant was in operation. The larger strip-mining companies were Buckeye Coal Co., Miller & McKnight, and Pengrove Coal Co. Equipment at strip mines included 11 power shovels and 8 drag lines, 4 of which had dipper capacities between 6 and 12 yards.

Sand and gravel production was more than twice that of 1963. Atlas Sand & Gravel, Inc., reported production for the first time. The product was used mainly for building and paving material. Other producers were Seidle Sand & Gravel Co., Mercer; Transfer Sand & Gravel Co., South Pymatuning Township; and Taylor Sand & Gravel Co., Big Bend. Sandstone for a variety of uses was produced by White Rock Silica Sand Co. at its Greenville quarry. Arthur J. Cobbie quarried dimension sandstone near Leesburg.

Mifflin.—Pennsylvania Glass Sand Corp. produced valuable industrial sand at its Hatfield works near McVeytown. Grinding and polishing, glass, and engine sands were the principal products. Two other sand and gravel pits were in operation producing construction sand and paving gravel.

Crushed limestone production in the county served the road construction and the iron and steel industries. Bethlehem Limestone Co. quarried limestone at its Naginey quarry, mostly for use as fluxing stone but also for aggregate use. Burkeholder & Burkeholder, acting as subcontractor for Wright Construction Co., produced crushed limestone for road construction from a large limestone cut at Milroy. Six limestone quarries were active in 1964; two more than in 1963. Agriculture was the chief use for the lime produced by Honey Creek Lime Co., Reedsville, and Ehrenzeller Lime Co., McVeytown. Haws Refractories Co. produced crushed quartzite for ganister near Hawstone.

Monroe.—Hamilton Stone Co., Inc., produced crushed limestone for roadstone and for sale to cement companies at a quarry and stationary plant near Bossardsville. Building sand and gravel, mainly for use

in ready-mixed concrete, was produced at stationary plants by Javelyn Mobile Mix, Inc., Stroudsburg, and Sheesley Minerals, Inc., Kunkletown. White clay was produced for cement manufacture at Kunkletown by Universal Atlas Cement Division, United States Steel Corp.

Montgomery.—Crushed limestone production increased to 3.3 million tons, 13 percent more than that of 1963. The county was second ranked in production of limestone. Increased consumption of flux for the iron and steel industry brought about increased captive output by Bethlehem Limestone Co., Bridgeport, and greater sales by G. & W. H. Corson, Inc., at Plymouth Meeting. These companies also produced construction aggregate, and the latter sold some of its production for magnesium metal manufacture and a variety of chemical uses. The Plymouth Meeting quarry of G. & W. H. Corson, Inc., received a Certificate of Achievement in Safety for operating throughout 1964 without a disabling work injury.

Allentown Portland Cement Co. manufactured portland and masonry cement at a plant in West Conshohocken. Output was entirely for general use and moderate heat cement. Eastern Pennsylvania and New Jersey were recipients of the major portion of company cement shipments. Three kilns were operated. The company quarried its limestone requirements. A production shutdown of 60 days was reported during 1964. Mignatti Construction Co., Inc., produced mostly crushed granite for construction aggregate and a small quantity of dimension granite near Bethayres. Montgomery Stone Co., Inc., produced both dimension and crushed basalt at its quarry near Montgomeryville. R. K. Kibblehouse and Pottstown Trap Rock Quarries, Inc., produced crushed basalt for aggregate at Perkiomenville and Sanatoga, respectively. Crushed argillite was produced by Gill Quarries, Inc., at quarries near Spring House and Norristown and by M & M Stone Co., Inc., Harleysville. A small quantity of rough construction dimension mica schist also was produced. Firestone Products Co., Inc., quarried dimension quartzite near Glenside for refractory uses (furnace linings), rubble, and a small tonnage of crushed sandstone. The Harleysville quarry of M & M Stone Co. received a Certificate of Achievement in Safety for operating throughout 1964 without a disabling work injury.

Mason's lime was by far the leading market for the output of the G. and W. H. Corson lime plant at Plymouth Meeting. Shale was mined near Trappe by the Philadelphia Brick Co. for heavy clay products and by The Robinson Clay Product Co. near Pottstown for vitrified sewer pipe. Common clay for flowerpots was produced by The Keller Pottery Co., North Wales. Refractory and Insulation Corp. produced expanded perlite at its Port Kennedy plant for a variety of filler and insulation uses. A small quantity of building sand was produced at a stationary plant near Norristown.

Montour.—Mausdale Quarry Co. produced crushed limestone for roadstone near Danville, and Lycoming Silica Sand Co. produced roadstone and agstone at a quarry near Milton. Sand and gravel for construction was produced by Thomas Sand & Gravel Co. at a stationary plant near Danville.

Northampton.—The county remained as first ranked in cement production with 10 plants in operation, shipping almost 18 million bar-

rels of portland cement. All but three of the companies also produced masonry cement. More than 900,000 barrels of masonry cement were shipped. The larger of the producing companies in order of shipments were Keystone Portland Cement Co., Bath; Universal Atlas Cement Division, United States Steel Corp., Northampton; Hercules Cement Co., Division of American Cement Corp., Stockertown; Nazareth Cement Co. and Lone Star Cement Corp., Pennsylvania Division, both of Nazareth. Ready-mixed concrete companies consumed the greatest portion of cement shipments and concrete product manufacturers also consumed significant quantities. Shipments were concentrated in the eastern Pennsylvania area but most of the Eastern States received cement shipments from the county. A total of 43 cement kilns were in operation. Keystone Portland Cement Co. closed the No. 6 Bath plant in late 1963, and the Bath No. 5 plant was used for cement regrinding only. The Alpha Portland Cement Co. closed its Martins Creek plant in October 1964. Competition for markets along the Atlantic seaboard continued to be intense. Wages were raised as second stage of a 2-year contract, and companies reported reduced profit margins.

Limestone production increased by 400,000 tons to 5.2 million tons, and the county continued as first ranked among the limestone producing companies. Cement manufacturing companies produced large quantities of captive limestone or cement rock in the Nazareth, Northampton, and Bath areas. Crushed limestone for concrete aggregate and roadstone was produced by Bethlehem Steel Co., Bethlehem, and The Trumbower Co., Inc., Nazareth. The Bethlehem quarry of Bethlehem Steel Co., the Keystone Quarry of the Keystone Portland Cement Co., The Fogelsville Quarry of Lehigh Cement Co., the No. 4 quarry of Penn-Dixie Cement Corp., the Nazareth Quarry of Nazareth Cement Co., and the Northampton quarry of Universal Atlas Cement Division, United States Steel Corp. received a certificate of Achievement in Safety for operating throughout 1964 without a disabling work injury.

Ten slate quarries were in operation in 1964. Leading dimension slate uses were for flagging, structural and sanitary ware, blackboards, bulletin boards, and roofing. Most dimension slate markets were virtually unchanged from that of 1963. One exception was for billiard table tops, which increased significantly. Nine of the slate-producing companies had value of output of more than $200,000. Leading dimension slate producers were Anthony Dally & Sons, Inc., Stephens-Jackson Co., D. Stoddard & Sons, Inc., Diamond Slate Co., and Doney Slate Corp., all of Pen Argyl. Crushed slate was produced by three operators, two of which also produced dimension slate. The leading crushed slate producer was Pennsylvania Lightweight Aggregate, Inc., Bangor, with output mostly for lightweight aggregate plus smaller quantities for roofing granules. Capitol Slate Co. purchased additional machinery, and Pennsylvania Lightweight Aggregate, Inc., installed new equipment and constructed a maintenance building.

Building and paving sand and gravel was produced at virtually the same rate as that of 1963. Companies active were Houdaille Construction Materials, Inc., Portland; W. J. Lowe & Sons, Inc., Bangor; and Lehigh Valley Sand & Gravel Co., Inc., Easton. Mineral Pig-

ments and Metals Division, Charles Pfizer and Co., Inc., Easton, and Reichard-Coulston, Inc., Bethlehem, produced finished (natural and manufactured) iron oxide pigments. Of total manufactured pigment production, the leading types were pure red calcined copperas and yellow iron oxide. The leading natural pigment product was mixtures of red and brown iron oxides.

Northumberland.—Anthracite production increased slightly to 2.1 million tons. The leading producers were the Susquehanna Coal Co., Reading Anthracite Co., and Rosini Coal Co.

The entire clay production was from mines in the Watsontown area. Glen Gery Shale Brick Corp. and Watsontown Brick Co. mined shale for building brick. Watsontown Mineral Products Co. mined shale for use as linoleum filler. Limestone for roadstone and agstone was produced by Eugene Meckley at a stationary plant near Herndon. Clyde Starook produced small quantities of agstone and aglime.

Perry.—Crushed limestone for roadstone was produced by Bradford Hills Quarry, Inc., at its Newport quarry.

Philadelphia.—The Liberty Corp. dredged large quantities of sand and gravel from the Delaware River near Philadelphia. Output was greater than that of 1963. The Atlantic Refining Co. recovered hydrogen sulfide (burned for sulfuric acid manufacture) and molten sulfur, and Gulf Oil Co. recovered sulfur by the Claus process, both at Philadelphia refineries. Calcined gypsum (stucco) was produced by U.S. Gypsum Co. at a plant in Philadelphia.

Potter.—Nine dimension sandstone quarries centered near Austin were in operation, producing mostly flagging. Penn Kress Flagstone Co., Inc., and Wright & Hoffman (formerly Rummings & Wright) were leading producers.

Schuylkill.—The county was the second-ranked anthracite producing area. Leading producers were Reading Anthracite Co., Greenwood Stripping Co., Mammoth Coal Co., Honeybrook Mines, Inc., and Gilberton Coal Co. Output was 5.8 million tons, a significant drop in production from the 6.5 million tons in 1963.

Summit Quarries produced construction quartzite aggregate near Summit Station, and Harbison-Walker Refractories Co. quarried and crushed quartzite for ganister near Andreas. Paving and fire or furnace sand was produced by Refractory Sand Co., Inc., at a stationary plant near Andreas. Auburn Brick Co. mined shale near Auburn for building brick. Lightweight aggregate was produced by Lehigh Materials Co. from shale supplied by various producers. Huss Contracting Co. operated a limestone quarry and stationary plant near Andreas producing aggregate and roadstone. Pennsylvania Aggregates, Inc., was idle in 1964. The peat bog of Frank Gozjalk located near Tamaqua was idle in 1964.

Somerset.—Bituminous coal production increased slightly to 3.2 million tons. Of this total, 57 percent was mined at 49 strip and 43 percent at 63 underground mines. The county was the third ranking strip-mining area. Stripping equipment included 75 power shovels and 46 draglines. Four power shovels and eight draglines had dipper capacities between 6 and 12 cubic yards. Coal seams stripped included all the Kittanning and Freeport beds. Underground mining was mostly in the Upper Kittanning seam. Of the underground output,

69 percent was mechanically loaded. Nine continuous miners were in use; two more than in 1963. Leading underground mines were operated by Bird Coal Co. and Solar Fuel Co. (three mines). Leading strip-mining companies were Svonavec Coal Co., Sanner Brothers Coal Co. (four mines), and Ponfeigh Smokeless Coal Co. (two mines).

Clay production was at virtually the same rate as that of 1963. General Refractories Co. was the leading producer, mining flint fire clay at three locations for its own use in manufacturing firebrick and block. A new overburden-stripping dragline was put into operation at the company Fort Hill opencut mine. Hiram Swank's Sons, Inc., operated an underground clay mine near Holsopple, producing plastic fire clay for manufacturing refractory products. Somerset Limestone Co., Inc., and Keystone Lime Co. produced crushed limestone for roadstone at Barkersville and Springs, respectively. The latter company also sold agstone.

Crushed sandstone for concrete and roadstone was produced by Detwiler Industries, Inc., Central City and Clarence Rodamer, Springs. Small quantities of sand and gravel aggregate were produced near Berlin and Boswell.

Snyder.—Crushed limestone for roadstone and agstone was produced by National Limestone Quarry at Middleburg. The company reported rewiring the plant for 440 volts in a conversion from diesel to electric power. Anthracite production increased slightly from that of 1963. Increased output of building and paving sand and gravel was reported by Central Builders Supply Co., from a stationary plant near Selinsgrove. Carton Comfort produced a small tonnage of aglime near Mount Pleasant Mills.

Susquehanna.—The Keller Supply Co., Inc., and Susquehanna Quarry Co. sold crushed sandstone (bluestone) from quarries near Clifford and Montrose, respectively. Seven dimension sandstone quarries were in operation producing mainly flagging. The leading producer was Mitchell Stone Co., Springville. Bennett's Quarry of Keeler Supply Co., Inc., received a Certificate of Achievement in Safety for operating throughout 1964 without a disabling work injury.

Tioga.—Bituminous coal production was less than that of 1963. Most of the output was strip mined by five companies. Only one small underground mine was active. Most of the output was from the Seymour seam. Leading strip-mining companies were Jones & Brague Mining Co. and Liberty Valley Construction Co. Fred Gee Gravel Co., a new producer, operated a portable plant near Middleburg Center and produced paving sand and gravel. A small quantity of sandstone rubble was quarried in Elk Township.

Union.—Faylor Lime and Stone Co. produced crushed limestone for roadstone and agstone at a quarry and stationary plant near Winfield, and John L. Iddings produced limestone for roadstone near Mifflinburg.

Venango.—Most of the county bituminous coal output was from 14 strip mines. Output was significantly less than that of 1963 even though 3 more strip mines (14) were in operation. Two auger mines and one small underground mine also were active. Equipment at strip mines included 24 power shovels and 14 draglines. Leading in production were the strip mines operated by Tasa Coal Co. and Testa

Brothers, Inc., and the auger mine operated by Black Diamond Coal Mining Co. Output was from the Clarion and Brookville coal seams.

Oil City Sand & Gravel Co., the leading producer, operated a dredge on the Allegheny River near Oil City producing building and paving sand and gravel. Industrial Silica Division, Pennsylvania Glass Sand Corp., produced molding and fire or furnace sand at its Venango Works near Utica. Paving and other gravel was produced by two additional companies in 1964.

Warren.—The first full year of production of a dredge operated by Warren Sand & Gravel Co., Inc., on the Allegheny River near Warren was the leading factor in the large increase in sand and gravel production. Other producers were General Concrete Products Corp. and Nelson & Ellberg, both of Warren.

Washington.—The county was first ranked in coal production. Output increased 1.3 million tons to 13.5 million tons. Underground mining increased 11 percent and compensated for decreased output in both strip and auger production. Of total output, 94 percent was mined at 21 underground operations; the balance was from 13 strip and 3 auger mines. In use at underground mines were 65 continuous miners, 2 more than in 1963. Virtually the entire underground production was loaded mechanically. Eight cleaning plants prepared 11.9 million tons. The entire county output was from the Pittsburgh coal seam. Leading underground producers were Bethlehem Mines Corp. (three mines); United States Steel Corp. (two mines); Pittsburgh Coal Co. (two mines); Mathies Coal Co.; and Jones & Laughlin Steel Corp. (two mines). Leading strip mines were Harman Creek Coal Corp. (also auger) and National Steel Corp.

Crushed limestone for roadstone was produced by Washington Stone Co. at a stationary plant near Washington. No clay was recovered at this quarry in 1964. The Appalachian Stone Division, Martin Marietta Corp. quarry was abandoned in 1964 following completion of Interstate Highway 70 in the area.

Wayne.—Sand and gravel production increased sharply over that of 1963. Keystone Pavement & Construction Co., Inc., produced paving sand and gravel near Lake Ariel. Wayne Concrete & Sand Works, Inc., produced crushed sandstone chiefly for concrete aggregate at a quarry near Lake Ariel. Anthracite coal production dropped from 7,500 tons in 1963 to 1,775 tons. Dimension sandstone (bluestone), chiefly for flagging, was quarried by three companies; the largest was the Paul Tompkins Estate. Wayne Peat Humus Co. mined moss and humus peat from a bog near Gouldsboro and sold the product both in packaged form and in bulk for general soil improvement uses.

Westmoreland.—Of the total coal production of 4.1 million tons, 95 percent was mined at 34 underground operations; the balance, from 1 auger and 25 strip mines. Most of the production came from the Pittsburgh and Upper Freeport coal seams. Of the underground output, 98 percent was loaded mechanically. Three more continuous miners (17) were used than in 1963. Six cleaning plants prepared 82 percent of total output. Leading underground mining companies were Republic Steel Corp., Delmont Fuel Co., Jamison Coal Co., Pittsburgh Coal Co., and Allegheny-Pittsburgh Coal Co. The leading strip producer was C. W. Brown. The Hutchison mine of Pittsburgh

Coal Co. received a Certificate of Achievement in Safety for operating throughout 1964 without a disabling work in jury.

Crushed sandstone entirely for use as concrete aggregate and roadstone, was produced by five companies at a lower rate than that of 1963. The leading producers were Latrobe Construction Co., Ligonier; Eidenmiller Enterprises, Inc., Lycippus; and J. M. Hall & J. M. Hall, Jr., Inc., Baggaley. Dimension sandstone for flagging was quarried by Lynn's Quarry near Belle Vernon. Latrobe Construction Co. added new ventilating equipment and increased the dust control facilities at its Longbridge underground mine. A small quantity of limestone was quarried mostly for use as aggregate by Paul W. Kendi & Sons, Inc., near Mt. Pleasant. The Whitney quarry of Eidenmiller Enterprises, Inc., received a Certificate of Achievement in Safety for operating throughout the year without a disabling work injury.

Davison Sand & Gravel Co. moved its marine dredge on the Allegheny River from Armstrong County and produced large quantities of building and paving sand and gravel. Aglime was produced by Agricultural Lime & Stone Co. at a plant near Derry.

Wyoming.—Increased sand and gravel production was reported by East Falls Sand & Gravel and Wyoming Sand & Stone Co., both at Falls. Output was mostly for building and paving aggregate. J. G. Robinson, Inc., quarried dimension sandstone (bluestone) for flagging.

York.—Medusa Portland Cement Co. produced both portland and masonry cement at its York plant. Portland cement output was mostly the general use, non-air-entrained type. Shipments were almost evenly divided between rail and truck. Most shipments were in bulk but significant quantities were shipped in paper bags. The company completed construction of its white cement plant in 1963 and has dismantled its gray cement plant. Capacity of the new plant is practically double that of the old one. Portland cement shipments were to 35 States and to foreign countries. Leading customers were ready-mixed concrete companies and concrete product manufacturers.

In terms of value, the county ranked first in limestone production. National Gypsum Co. with a large high-priced market in whiting for floor covering and White Pigment Corp., producing for a wide variety of whiting markets, contributed significantly to the high-county valuation. Both companies had quarries near York. In terms of tonnage, Thomasville Stone & Lime Co. and Lincoln Stone Co., both of Thomasville, and J. E. Baker Co., York, were the leading producers. Metallurgical flux, dead-burned dolomite, aggregate uses, and cement manufacture were leading markets. J. E. Baker produced dead-burned dolomite at its York plant. Ten quarries were in operation, and production was at virtually the same rate as that of 1963. The Ruberoid Co. produced crushed slate for roofing granules and for slate flour at a quarry and plant near Delta.

The York quarry of The J. E. Baker Co. and the Delta quarry of The Ruberoid Co. received Certificates of Achievement in Safety for operating throughout 1964 without a disabling work injury.

Pennsy Supply, Inc., produced building and paving sand and gravel at a stationary plant near York Haven. Neuman Sand & Supply Co. produced building sand near York. County sand and gravel output was greater than that of 1963.

Glen Gery Shale Brick Corp., York Colonial Division, operated an opencut shale mine near Dover producing shale for captive use in building brick manufacture. Medusa Portland Cement Co. mined miscellaneous clay near York for use in its cement plant. General Mining Associates recovered flake mica from sericite near Glenville and sold the product to paint and welding rod manufacturers and for use as mold lubricant (rubber). Pennsylvania Perlite Corp. produced expanded perlite for use mainly as lightweight aggregate in building plaster.

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